TECHNOLOGY DEPT.

FOUNDRY

AUGUST
1955

A PENTON PUBLICATION

#8

Raising Plant Efficiency—p. 86

- ✔ **NEW CENTRIFUGAL PROCESS** uses a sand-resin lining in casting pressure pipe—p. 90
- ✔ **BRASS FOUNDRY PRACTICE** is affected by men, machines, metal and sand—p. 94
- ✔ **SHELL MOLDING.** Here are points to consider when starting to use the process—p. 104

PURITE

... for 100% fluxing action in the cupola

PURITE

... for 100% desulphurizing action in the ladle

1. Purite produces higher percentages of finished castings—fewer rejects per ton of metal poured.
2. Purite is time-tested and proved for rapid and unsurpassed desulphurizing uniformity.
3. Purite permits the use of higher-sulphur raw materials.
4. Purite is 100% pure fused soda ash—you do not pay for inert materials.
5. Purite comes in uniform 2-lb. pigs—no weighing or measuring required.
6. Purite does not crumble—is easy to handle —no waste, no dust.
7. Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration.

Purite, the scientific flux for better melting and cleaner iron, is sold by leading foundry supply houses in the United States and Canada.

MATHIESON

MATHIESON CHEMICALS
OLIN MATHIESON CHEMICAL CORPORATION
INDUSTRIAL CHEMICALS DIVISION · BALTIMORE 3, MD.

Under the table pay-off

. . . or what Chuck Wright recommends for a grinder's bed

"Tim's got a bigger bankroll now and he's entitled to it," asserted Chuck Wright.

Chuck, the INCO distributor foundry specialist, was speaking about Supt. Tim Dineen of the Webb Foundry.

"Webb's customers seldom rejected a casting," declared Chuck. "Until a couple of months ago, when the foundry got an order for grinder beds.

"Tim called our office and said he was holding a bear by the tail. He really was. Because composition, pouring temperature, sand condition . . . everything appeared to be under control. Yet when the customer got those grinder beds, he ran into hard edges and poor machinability in the lighter sections of the T-slots.

"So I drove out to see a reject, first hand. It didn't take me long to see that foundry practice alone couldn't solve the problem. Foundry control provided density of the heavy sections but it cannot give the essential uniformity and machinability in both light and heavy sections.

"Grinder beds and the like . . . with light and heavy sections . . . must be machinable throughout. And there's nothing like a little nickel to improve the uniformity of structure all through a casting, consistently.

"After Tim added 1% nickel to his mix, results added up to more than he expected. Now the customer gets machinability in the light sections, and a dense close grained structure in heavy sections. Properties and service performance are also improved. Another result is the new figure on Tim's paycheck. What it is . . . that's for him to say.

"Sometime you may run into a problem that involves the metallurgy of castings. Whenever that happens, I'll be glad to help you, too."

Chuck Wright

P.S. Just drop me a line in care of INCO.

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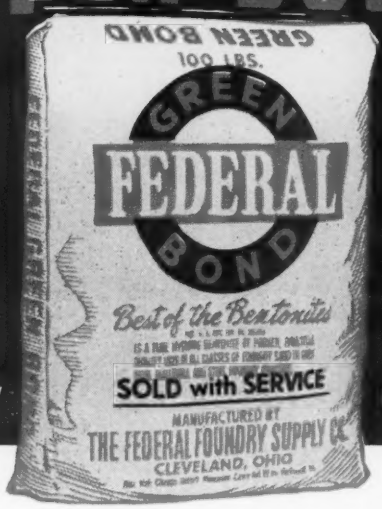
The International Nickel Company, Inc.

67 Wall Street New York 5, N.Y.

GREEN BOND
GREEN BOND
GREEN BOND
GREEN BOND



PURE BENTONITE . . . SPECIALLY PREPARED FOR FOUNDRY USE

the standard of the world for 30 years

Bentonite was first developed in 1925, by FEDERAL, as an admix to molding and core sands. FEDERAL GREEN BOND was introduced at that time as a *pure* bentonite of the highest quality, specially processed for foundry use. It's been just that ever since—unadulterated, untreated, free of chemicals or other ingredients detrimental to foundry sands or operating conditions.

FEDERAL GREEN BOND is supplied in *three* convenient forms: (1) PULVERIZED—for general foundry use as a dry additive for core and molding sand; (2) GB-100 FINE GRANULAR—a dry additive with low dust content, for core and molding sand; (3) No. 1200 SLURRY GRADE GRANULAR—for use as a wet additive.

Next time you buy bentonite—buy the "Best of the Bentonites", the old reliable—FEDERAL GREEN BOND!

FEDERAL warehouses are located in CHICAGO · CHATTANOOGA · CROWN HILL, WEST VA. · DETROIT · MILWAUKEE · NEW YORK · RICHMOND, VA. · ST. LOUIS · UPTON, WYO. *FEDERAL GREEN BOND is also available in* BIRMINGHAM JACKSONVILLE, FLA. · LOS ANGELES · MINNEAPOLIS · OAKLAND, CALIF. · PORTLAND and SEATTLE, WASH.

FEDERAL

The **FEDERAL FOUNDRY SUPPLY** *Company*

4600 EAST 71st STREET, CLEVELAND 5, OHIO

FOUNDRY
A PENTON PUBLICATION

August 1955
Volume 83—Number 8

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THE COVER: Colorful foundry scene portraying the tapping of an indirect arc electric furnace. Illustration is by courtesy of the Eaton Mfg. Co., Cleveland

Editorial 85

SPECIAL ARTICLES

Modernization Raises Plant Efficiency 86
Through mechanization a foundry meets demand for lower cost castings and higher production rates—By E. A. SWENSSON and J. F. GALLAGHER

New Centrifugal Process Uses Sand-Resin 90
Gray iron pressure pipe is centrifugally cast by new method using a metal flask lined with resin-bonded sand—By EDWIN BREMER

The Brass Foundry 94
First of a series pointed to copper-base alloy foundrymen detailing how costs can be cut and quality improved—By HARRY ST. JOHN

Mechanizing a Small Foundry 98
Small, captive nonferrous foundry handling highly repetitive work benefits from its efficient, mechanized plant layout—By WILLIAM G. GUDE

Huge Castings Required for Heavy Forging Presses 101
Huge castings are vital to the construction of some of the world's biggest forging presses as part of the Air Force heavy press program

So You Are Going To Try Shell Molding? 104
Practical advice and operational hints for those foundrymen considering installation of a shell molding operation—By JOHN G. STEINEBACH

A New Role for Pattern Shops 108
Today's successful pattern shop can earn its keep through added service as design consultants—By AL BROCKLEBANK and W. J. SIKULA

Safety Is No Accident 110
Steel Founders' Society proves that a continuing program of accident prevention has many lasting benefits—By JACK C. MISKE

Foundries Operating in United States and Canada 114
Malleable Founders' Society Annual Meeting 128
ASTM Holds Annual Meeting 138
Making Precision Castings in Glass Molds 140
Man-to-Man By RALPH L. LEE 144
Missouri Valley Regional Conference Program 178
International Foundry Congress By VINCENT DELPORT 180
Trouble Shooting By C. W. AMMEN 214

AFS HOUSTON CONVENTION

Reports on Technical Meetings 151

Nondestructive Testing	151	**Safety and Hygiene**	162
Steel Castings	152	**Heat Transfer**	165
Malleable Shop Course	157	**Brass Shop Course**	168
Core and Molding Sands	158	**Foundry Costs**	168
Gray Iron	170		

NEWS FEATURES

Around the Country	208	**Late Foundry News**	33
Calendar of Meetings	14	**Men of Industry**	121
Foundry Group Activities	220	**News Views**	148
Industry Briefs	176	**Obituary**	225

REGULAR DEPARTMENTS

Classified Advertising	247	**New Equipment and Supplies**	192
Data Sheet	231	**Questions and Answers**	116
Foundry Developments	190	**Statistics**	205
Ideas for Foundrymen	195	**Trade Publications**	234
Meditations of a Sandman	226	**With the Editors**	10

Business Staff—page 257 Advertisers' Index—page 257

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Gigantic casting by Lynchburg Foundry

Moving out of Radford, Va., on its way to Baldwin-Lima-Hamilton Corporation is one of the largest castings in current production at the Radford Plant of the famous Lynchburg Foundry Company.

Weighing 26 tons and measuring 9 ft. x 6½ ft. x 17 ft., this block of cast iron will go into service as an upright for a huge press.

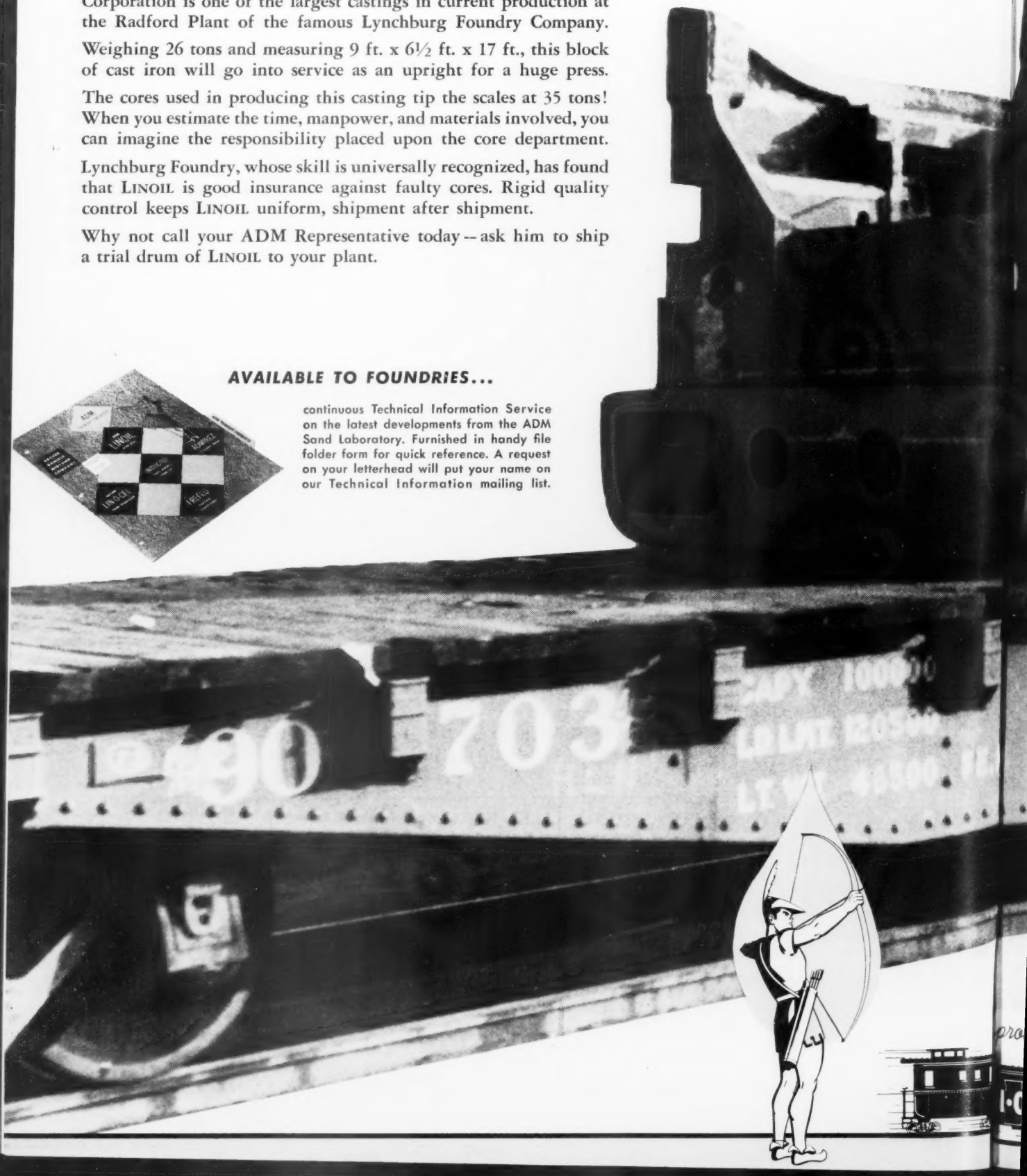
The cores used in producing this casting tip the scales at 35 tons! When you estimate the time, manpower, and materials involved, you can imagine the responsibility placed upon the core department.

Lynchburg Foundry, whose skill is universally recognized, has found that LINOIL is good insurance against faulty cores. Rigid quality control keeps LINOIL uniform, shipment after shipment.

Why not call your ADM Representative today -- ask him to ship a trial drum of LINOIL to your plant.

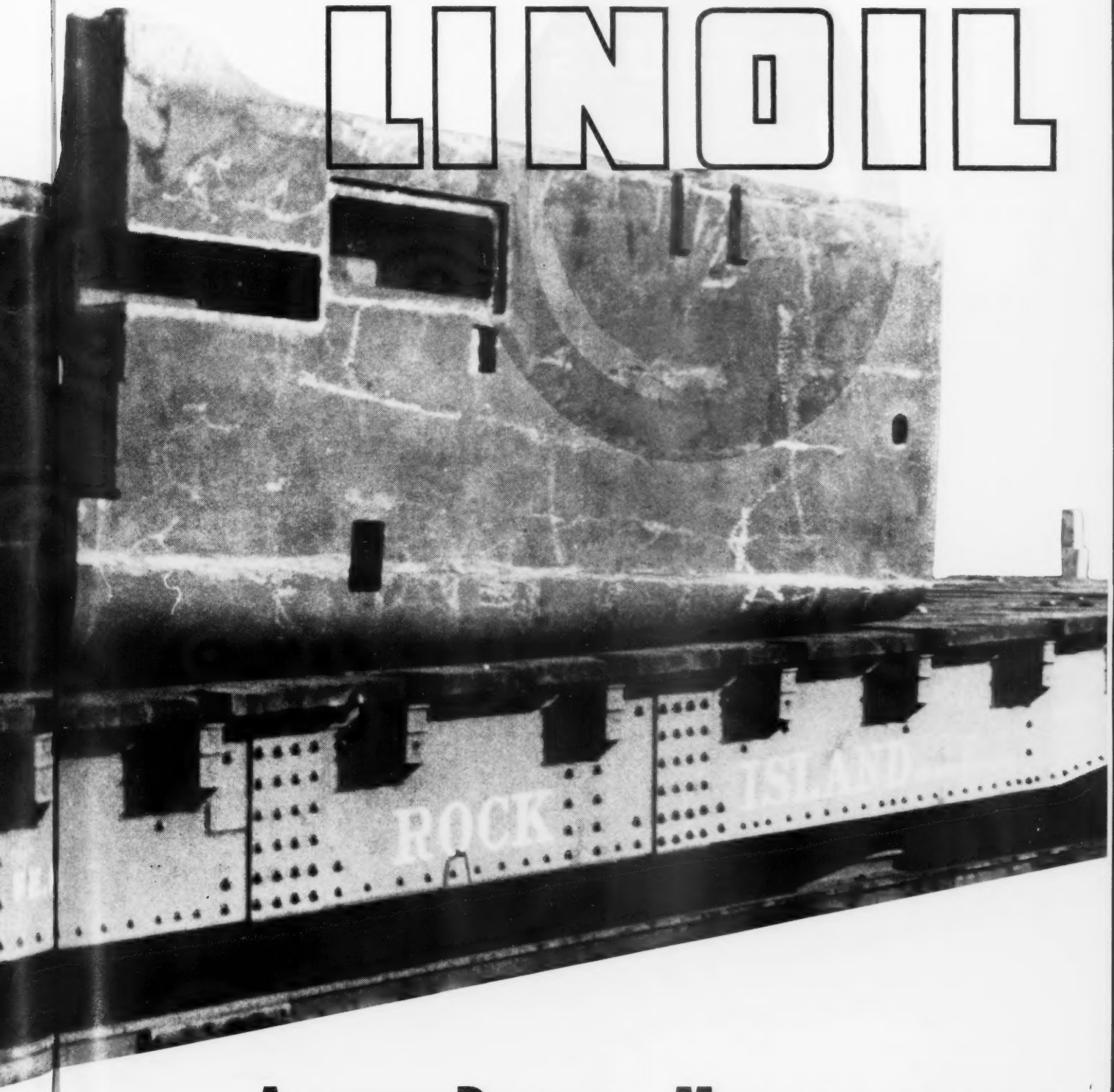
AVAILABLE TO FOUNDRIES...

continuous Technical Information Service on the latest developments from the ADM Sand Laboratory. Furnished in handy file folder form for quick reference. A request on your letterhead will put your name on our Technical Information mailing list.



ry Co. takes 118 gallons of

LINOIL



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FOUNDRY PRODUCTS DIVISION • 2191 WEST 110TH STREET • CLEVELAND 2, OHIO

producers of

Robinson Air-Activated Conveyors*

Serve the FORD

The Ford Company is noted for its policy of setting up modern and efficient operations. The River Rouge Foundry is no exception.

Here, three separate Robinson Systems convey bonding materials to nine molding lines, the farthest being 1000 feet away. The materials—Southern and Western Bentonite and Sea Coal—are stored in bulk bins and under each bin is a Robinson Activator which upon demand conveys its material to any of the nine molding lines.

Over the mixers at each molding line are three small batching bins, one for each bonding material, which are equipped with high-level and low-level indicators. High and low signals from these process bins actuate signal lights on the master control panel located at the storage bins. On a low-bin signal, for example, the proper Activator is connected to that bin by a remotely controlled diversion valve and then replenishes the supply.

The only carriers are three 3-inch transport pipelines located on the wall well out of the way with take-off lines leading to the batching storage bins. The Robinson System is dust-tight. The only 'power' needed is a relatively small quantity of compressed air from the plant's main supply.

Other foundries using the Robinson System for conveying binders or foundry sands include:

The Ford Company of Canada
Lynchburg Foundry
Chevrolet
General Motors Research
United States Steel—Edgar Thompson Works

Many Robinson Systems are also being used in the broad chemical processing field for handling dry-pulverized and fine-granular materials.

Would you like to know more about the Robinson Conveying System? We'll be glad to send complete details.

Salient Features of the Robinson Air-Activated Conveyor System include:

Low first cost . . . particularly on long carries; only relatively small diameter piping is used

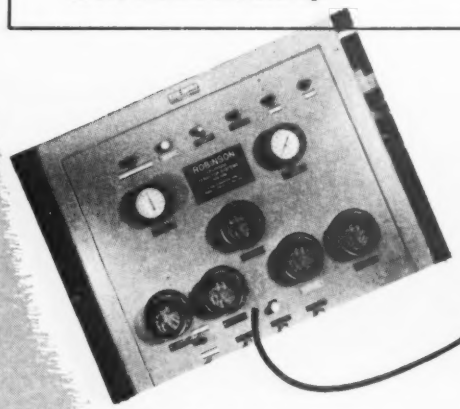
Low operating costs . . the only power is plant air used intermittently. Average air requirement is less than one-half cubic foot of free air per pound of material handled.

Low maintenance cost . . . no moving parts such as motors, screws or shafts and bearings.

Clean . . . The Robinson System is entirely enclosed and dust tight.

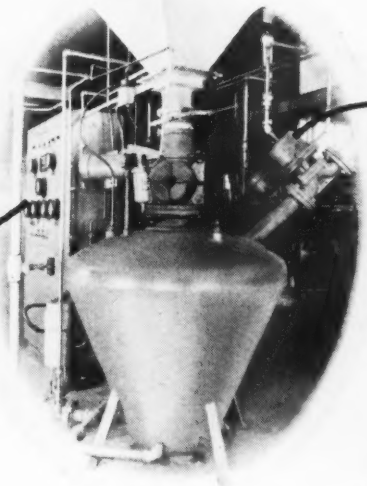
Flexible . . . controls may be manual or completely automatic; remote and integrated with component equipment.

Weighed Batches . . . Precisely Accurate . . . these can be arranged for by mounting the Activator on scales; batch weights can be automatically recorded.



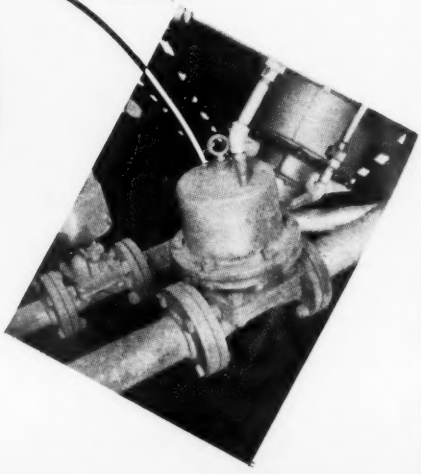
Control Panel for use on the Robinson Systems.

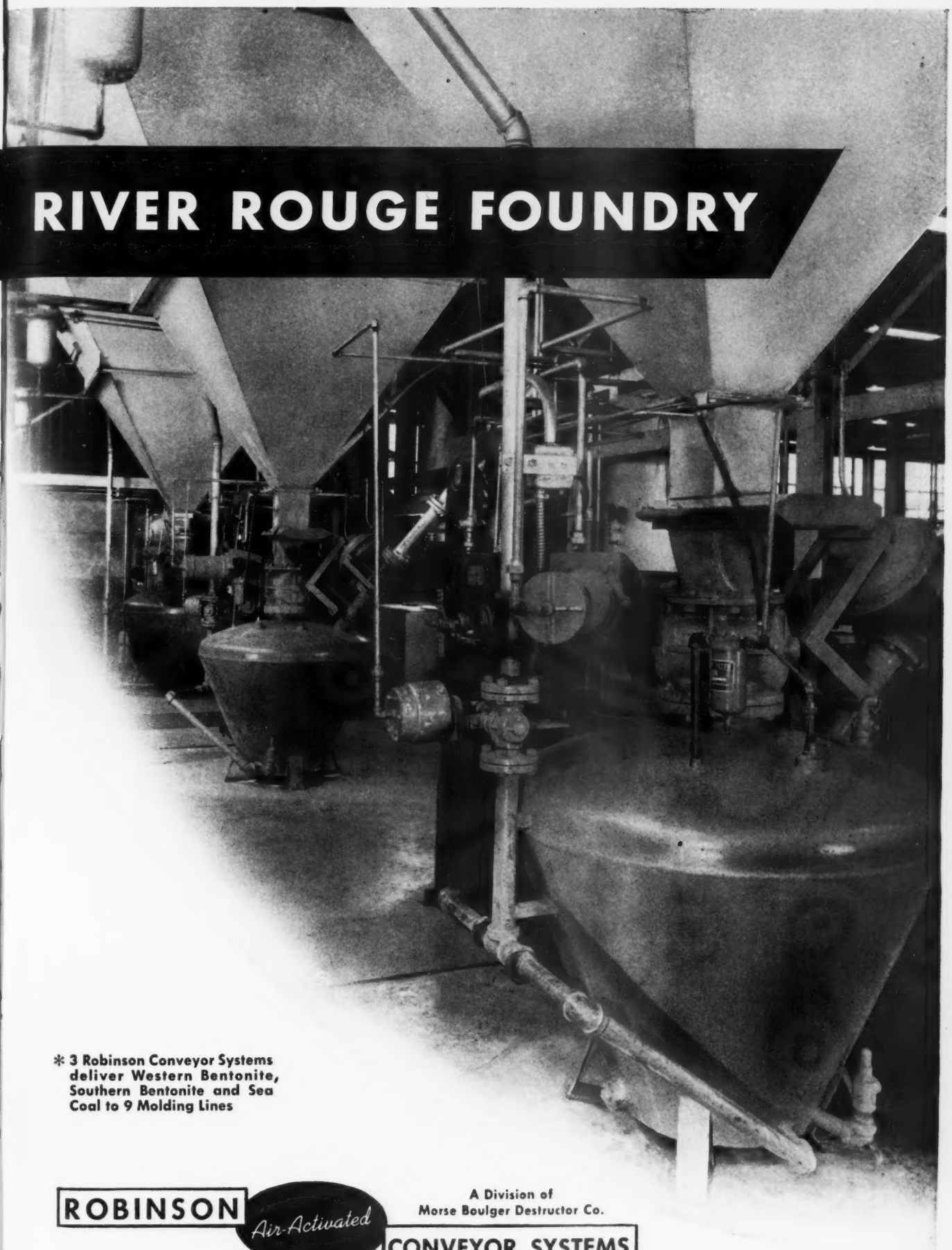
All valves in the Robinson System are air-operated. No auxiliary motors are required.



Activator and Control Panel.

Air-operated Valve on Discharge Line from Activator.





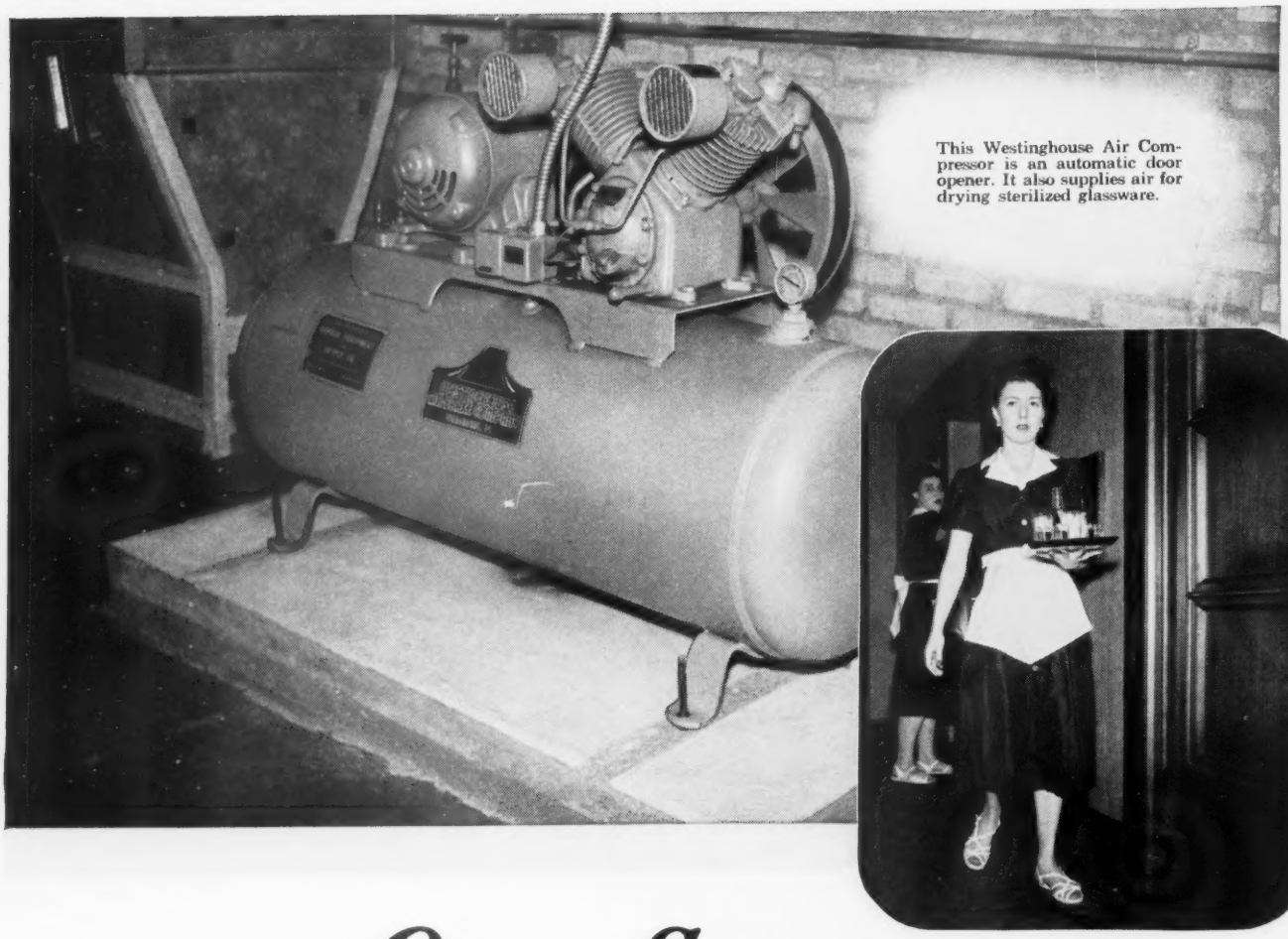
* 3 Robinson Conveyor Systems deliver Western Bentonite, Southern Bentonite and Sea Coal to 9 Molding Lines

ROBINSON *Air-Activated* CONVEYOR SYSTEMS

A Division of
Morse Boulger Destructor Co.

80-W FIFTH AVENUE • NEW YORK 11, N. Y.

Representatives in Principal Cities



This Westinghouse Air Compressor is an automatic door opener. It also supplies air for drying sterilized glassware.

Open Sesame

...the magic flexibility of air power supplied by Westinghouse Air Compressors, opens the door to greater efficiency, lower costs

The usefulness of compressed air is little short of amazing. It opens doors, inflates tires, paints equipment, runs punch presses, operates hoists and myriads of pneumatic tools that multiply a worker's productivity.

There are many more uses, but they all add up to lower costs. That's why the source of your air power is so important. It must be dependable to produce maximum savings — it should be a Westinghouse Compressor. Here are a few reasons why:

Low oil-level protection — your Westinghouse won't pump air if the oil-level or oil pressure is too low. You never get repair bills for lack of lubrication.

Automotive-type lubrication — constant pressure principle forces oil to every moving part for longer life.

Single- and two-stage, air-cooled design — provide air at maximum efficiency. Cost less to operate.

Starting unloader — keeps compressor unloaded until motor reaches normal speed and oil circulation starts.

Thermal overload protection — cuts current if motor should overheat or if line voltage should drop.

Open the door to lower costs with dependable air power. Insist on Westinghouse Air Compressors in your plant. Sizes up to 40 hp. Write for latest literature.

W-104

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 14, Wisconsin

PORTABLE AIR COMPRESSORS

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STATIONARY AIR COMPRESSORS

AIR TOOLS

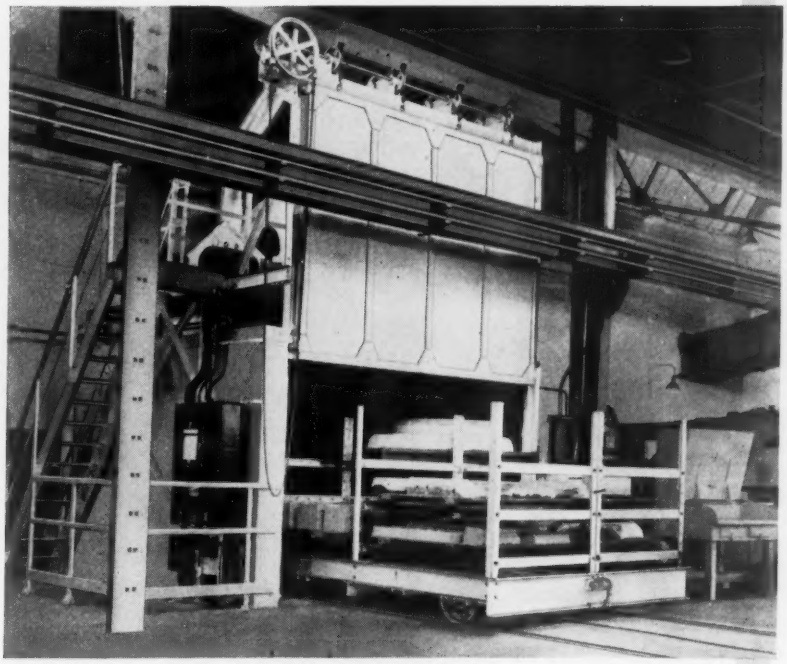
ENGINES

Distributors in all principal cities

Performance records prove

COLEMAN OVENS

reduce foundry costs



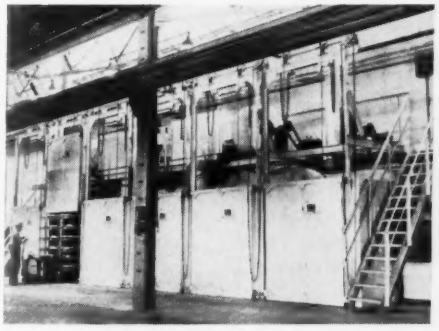
Coleman Car-Type Oven

Coleman Core and Mold Ovens reduce foundry costs by producing more efficiently . . . more dependably . . . year after year. They are as fine as modern engineering can make them because they are the result of *MORE THAN A HALF A CENTURY* of specialized foundry oven experience.

Statements like these from foundrymen everywhere prove that Coleman Ovens are vital to more profitable operations:—

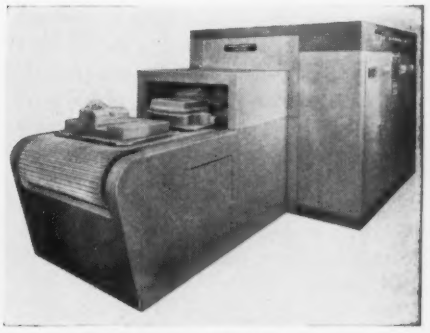
". . . we are getting smoother castings and a reduction of our scrap casting losses." — ". . . we are able to turn out 25% more cores with the same amount of labor." — "We have perfectly dried molds everytime." — "It saved us a lot of money and headaches" — "the resultant cores are more uniformly baked and our entire operation is more economical."

Actual performance records prove that Coleman Ovens may reduce overall core department costs by as much as 50%! Such savings mean increased profits and rapid amortization of investment. Many Coleman Ovens have paid for themselves in less than a year!



Coleman Transrack Ovens

Coleman Tower® Oven



Coleman Dielectric Oven

With production savings so important to profits, it will pay you to investigate the unusual advantages of Coleman Ovens now! For better castings at lower cost let our experienced Engineers give you practical recommendations for your particular requirements.

AS BUILDERS OF THE WORLD'S ONLY COMPLETE LINE OF FOUNDRY OVENS, WE HAVE NO REASON TO RECOMMEND ANY BUT THE BEST OVEN SUITED TO YOUR PURPOSE.

WRITE FOR BULLETIN 54

A COMPLETE RANGE OF TYPES AND SIZES . . .

for every core baking and mold drying requirement:

Tower Ovens • Horizontal Conveyor Ovens
Car-Type Core Ovens • Car-Type Mold Ovens
Transrack Ovens • Rolling Drawer Ovens
Portable Core Ovens • Portable Mold Dryers
Dielectric Core Ovens

THE FOUNDRY EQUIPMENT COMPANY
1321 COLUMBUS ROAD **CLEVELAND 13, OHIO**

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

That's the load this Imperial Belt handles

In the Landers, Frary & Clark foundry at New Britain, Conn., this Imperial Standard Sahara Belt receives 250 F. sand from the shake-out and carries it to the mixers.

Operating at a speed of 100 feet per minute, it moves 47 tons of sand per hour . . . 376 tons every 8-hour day!

Made to last longer. Danger of damage by heat and abrasion is high. In addition, there are gaggers in the sand for about half the belt length, until removal by a magnet. But Imperial's super-tough construction of heavy-duty hard silver duck enables it to withstand this rigorous service . . . performing satisfactorily day-after-day without costly shut-downs for maintenance.

The five plies of this belt (132' x 18") are double stitched with inner-locking stitches to positively prevent ply separation. Imperial's exclusive impregnating compounds lubricate and toughen the base fabric and insulate it against the destructive action of sustained temperatures to 300° F. and temporary peaks of 350° F. Other Imperial Belts are made to withstand temperatures as high as 600° F.

Job-designed belting. Whatever your belting needs, there is an Imperial job-designed belt that will outperform any other belting made and give you lowest long-time operating cost. Write for Data Sheet 54-2 and describe your belting problem.

Imperial
BELTING CO.
1757 S. Kilbourn Ave., Chicago 23, Ill.

You expect more from Imperial . . . and you get more!

With the EDITORS

CHEVROLET STORY: In September, FOUNDRY will present the Chevrolet Story, a comprehensive series of articles describing the entire operation of the newest GM foundry. Late in April, editors Bob Herrmann, Ed Bremer and Ken Mountain spent a week at Tonawanda, N. Y., gathering data for this extensive presentation. The articles have been written and now Art Editor Don Cadot is preparing the layout, and plant layout drawings are being made by artist Ed Drozdz. Readers should find much of interest in this feature of the September issue. Watch for it.

—o—

Shell Molding: Foundrymen continue an active interest in the subject of shell molding. In fact the desire for more information on this method of casting appears to be increasing. This is indicated in our conversations with foundrymen and is borne out through editorial studies made by the Eastman Research Organization, New York. This firm serves FOUNDRY exclusively in the field of castings production.

Thus far in 1955, FOUNDRY has presented the following articles: "Shell Molding Is Easier," by Ray Olson, Production Pattern & Foundry Co., Chicopee, Mass. (January, p. 76); "Shell Mold Line Expands Malleable Castings Output," by Robert H. Herrmann, associate editor (April, page 90); "Refinements in Process Feature Shell Molding," by J. E. Bolt, General Electric Co., Pittsfield, Mass., a part of the Special Report on Foundry Processes (May, page 107); "Does Shell Molding Belong in Your Foundry?" by John G. Steinebach, foundry engineer (June, page 81). Numerous items on developments of machines and materials for shell molding also have been reported.

Another article by John Steinebach giving suggestions on how the small foundry can get into the shell molding field is presented in this issue. To set the record straight, I should mention that John is the son of the editor, and has been in the foundry industry since graduation from Purdue in 1949. He has had considerable experience with shell molding problems.

—o—

Lynchburg: The subject of shell molding will be discussed further in the October issue. About the time this page goes to press, Bob Herrmann will visit the Lynchburg Foundry Co. at Lynchburg, Va., to obtain data for an article covering the complete shell molding operation at that plant. Many of the photographs already have been made, through the exceptionally fine cooperation of Lloyd C. McNeill, general manager of Lynchburg. The editors believe that the story on this operation should prove of considerable interest to virtually all readers of FOUNDRY.

—o—

Case Awards: Charles F. Walton, technical director, Gray Iron Founders' Society, Cleveland, received a master of science degree in industrial engineering at the Case Institute of Technology graduation on June 9. Presentation of the diploma was made by Dr. T. Keith Glennan, president of Case. Dr. Glennan is well known to many in the foundry industry and was the dinner speaker at the 1955 annual conference of the Foundry Educational Foundation.

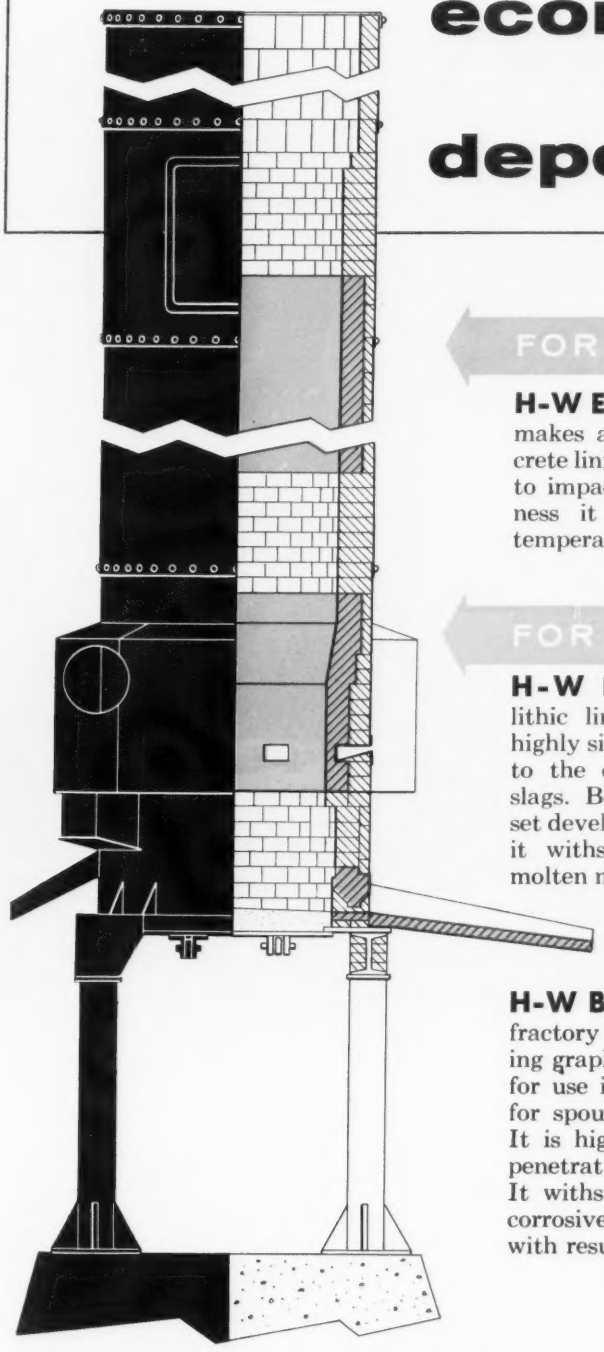
—o—

Anniversary: On June 9, the Elyria Foundry Division of Industrial Brownhoist Corp., Elyria, O., celebrated its 50th anniversary. The program, staged especially for customers and suppliers of that foundry, included a trip through the plant, luncheon, a presentation covering how and why the division makes good castings, and a dinner. A part of the celebration was the publication of a beautifully illustrated anniversary booklet describing the facilities provided by the division. Congratulations to Howard C. Gollmar and his fine organization

Harbison-Walker *Monolithic* cupola linings

economical to install and maintain . . .

dependable in service . . .



FOR THE CHARGING ZONE

H-W Extra Strength Castable makes a hard, strong refractory concrete lining which is extremely resistant to impact and abrasion. In refractoriness it is adequate for service at temperatures up to 2400°F.

FOR THE MELTING ZONE

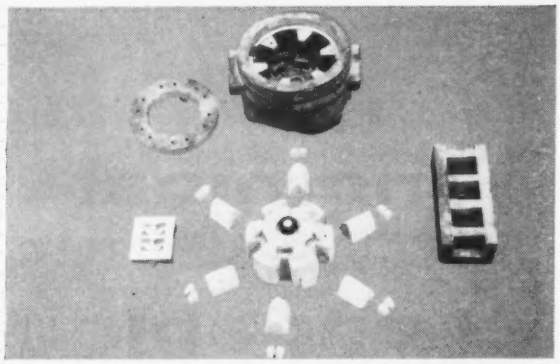
H-W Kuplomix provides monolithic linings free from joints. It is highly siliceous and extremely resistant to the corrosive action of non-basic slags. Because of the strong ceramic set developed at working temperatures, it withstands the erosive action of molten metal and slag to a high degree.

FOR THE BOTTOM ZONE

H-W Black Patch is a plastic refractory of super-duty quality containing graphite, which is especially suited for use in the cupola breast wall and for spouts, runners and ladle linings. It is highly resistant to wetting and penetration by molten iron and slags. It withstands the severe erosive and corrosive action of metals and slags with resultant longer service life.

In addition to the above, Harbison-Walker products include all classes of commercial refractories for every foundry requirement.

HARBISON-WALKER REFRACTORIES CO.
AND SUBSIDIARIES
World's Largest Producer of Refractories
GENERAL OFFICES: PITTSBURGH 22, PENNA.



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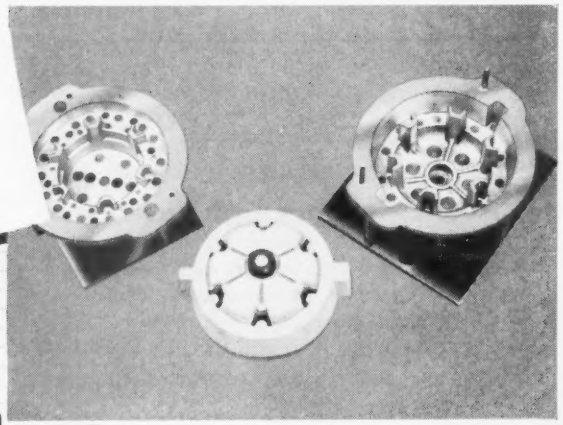


WITH A

Well-Made PATTERN

This may be simple arithmetic but it didn't seem so to one of our customers. When he brought this job to us, it required thirteen cores.

Our pattern engineers suggested a design change in the casting which eliminated six cores. The remaining seven cores were then easily combined, substituting one pattern and one core for the original thirteen.

The result was an immediate production increase and cost reduction by eliminating extra work in the core room, tedious fitting on the molding floor and excessive flashing removal after the casting was made.

An unusual case? Not particularly. Because of our long experience in the pattern business as well as the foundry business, our pattern engineers look at every job with a practical eye. Our patterns are Well-Made not only to meet blue print specifications, but also to function efficiently when translated into sand and hot metal on the mold floor.

For complete information write for Catalog 53.

Well-Cast MAGNESIUM, ALUMINUM AND BRONZE CASTINGS

Well-Made WOOD AND METAL PATTERNS

THE WELLMAN BRONZE & ALUMINUM CO.

Dept. 7, 12800 Shaker Boulevard Cleveland 20, Ohio

for doing such a good job in the production of castings, and in utilizing the anniversary to tell customers about it.

—o—

Eighty Years: I did not have a recent photograph of Dr. Guilliam H. Clamer, president, Ajax Electro Metallurgical Corp., Philadelphia, and associated companies, when congratulations were offered in the June issue (page 12). However, Ben Kaufman, director of public relations, Ajax Metal Division, H. Kramer & Co., Philadelphia, has sent a picture of the doctor made at a special dinner marking his 80th birthday. I think he looks just as energetic as when I first met him at the Milwaukee convention in 1924.

—o—

Handling Study: Materials handling is one of the important factors affecting the cost of producing castings. Year by year, more handling is being performed mechanically, but much seems to be ahead in this field.

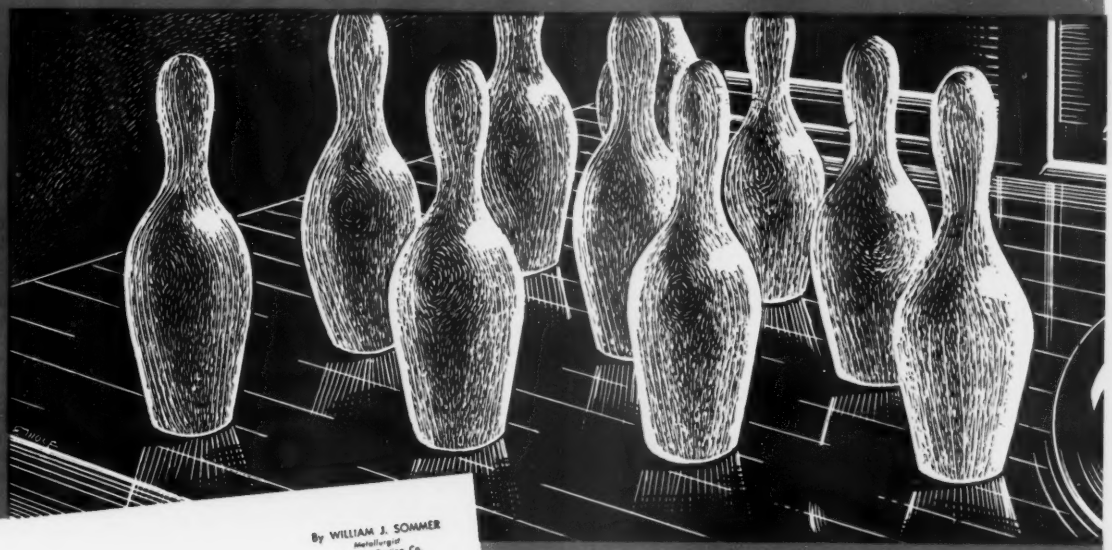
Believing that readers of FOUNDRY will be interested in knowing just how much materials handling equipment is in use, and the trends of future mechanization in that direction, FOUNDRY is undertaking a study.

A compact and rather simple "Request for information" has been sent to a cross-section of the foundry industry. If you receive one, you will be helping the editors considerably and at the same time adding to the knowledge of the industry's ability to produce, if you will see that the desired information is provided and the material returned promptly. Of course, all information is confidential, and will be used only to ascertain industry totals.

Thanks so much for your help.

F.G.S.

uniformity



By WILLIAM J. SOMMER
Metallurgist
Plainville Casting Co.
Plainville, Conn.

Quality Control:

IT'S IN THE REACH OF SMALL FOUNDRIES

Look at your inspection setup. If you're making chemical analyses, inspecting patterns, or castings, chances are you have basic elements needed to start quality control program

WITH THE foundry industry as a whole becoming more and more quality conscious and the larger companies setting up elaborate quality control programs, many smaller foundries ... to

ing group are all too interested in getting the work out and meeting delivery dates. If possible by-pass your standards department or time study men. Their chief concern is getting rate of ... up and ... rd de- ... sts do ...

reason for the scrap. The type of scrap record you keep is optional, but it should contain such pertinent data as date, customer's name, pattern number, total cast ... total scrap ... down ...

let uniform DIXIE BOND help you obtain *quality control*

Uniformity in materials all through the plant, — that is one big, indispensable aid toward the all-important end of quality control. Your molding sand must be uniform. For that uniformity you can depend upon Dixie Bond, produced under the strictest of laboratory control.

That isn't all. With Dixie you get also fast, easy shake-out; longer-lived flasks, more crack-less castings. You benefit from moderate dry and hot strength, the highest green strength known to the industry, high permeability, high flowability, and a high sintering point.

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DIXIE BOND *bulletin*

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uniformity and
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silica flour

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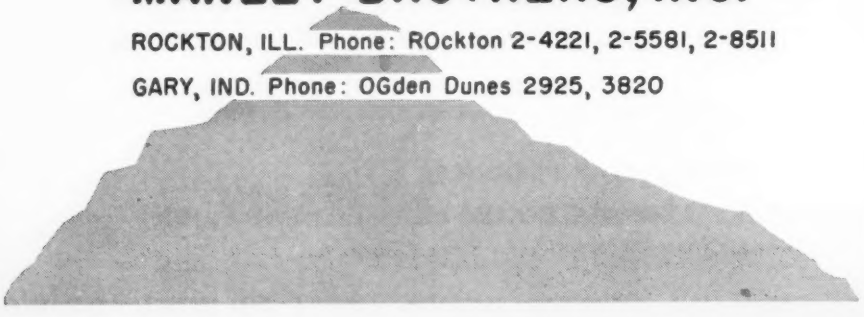


CALENDAR of Meetings

Sept. 6-17—National Machine Tool Builders Association, machine tool show, International Amphitheater, Chicago.

Sept. 6-17—Coliseum Machinery Show, Chicago Coliseum, Chicago.

Sept. 6-17—Production Engineering Show, Navy Pier, Chicago.

Sept. 12-16—Industrial Engineering Conference, Michigan State University, East Lansing, Mich.

Sept. 29-30—Missouri Valley Regional Foundry Conference, sponsored by St. Louis, Tri-State, and Mo-Kan Chapters of AFS and Missouri School of Mines Student Chapter, at Missouri School of Mines and Metallurgy, Rolla, Mo.

Oct. 6-7—National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago.

Oct. 13-15—Foundry Equipment Manufacturers Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 14-16—Northwest Regional Foundry Conference, Portland, Oreg.

Oct. 16-18—Conveyor Equipment Manufacturers Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-18—American Coke & Coal Chemicals Institute, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-21—American Society for Metals, national metal exposition and congress, Convention Hall, Philadelphia.

Oct. 17-21—National Safety Council, national safety congress and exposition, Conrad Hilton, Congress, Morrison and LaSalle Hotels, Chicago.

Oct. 18—American Society of Safety Engineers, annual meeting, Conrad Hilton Hotel, Chicago.

Oct. 19-21—Gray Iron Founders' Society, annual meeting, Schroeder Hotel, Milwaukee.

Oct. 20-21—Ohio Regional Foundry Conference, sponsored by Ohio AFS chapters, Case Institute of Technology, Cleveland.

Oct. 24-25—Steel Founders' Society of America, fall meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 31-Nov. 1—Magnesium Association, annual meeting, Biltmore Hotel, New York.

Nov. 1-3—Investment Casting Institute, fall meeting, Sheraton-Cadillac Hotel, Detroit.

Nov. 1-3—Grinding Wheel Institute and Abrasive Grain Association, fall meeting, Statler Hotel, Buffalo.

Nov. 3-4—Metals Casting Conference, Purdue University, Lafayette, Ind.

Nov. 14-17—Second International Automation Exposition, Navy Pier, Chicago.

Nov. 16-18—Steel Founders' Society, annual Technical and Operating Conference, Hotel Carter, Cleveland.

Dec. 1-2—Michigan Regional Foundry Conference, Michigan State University, East Lansing, Mich.

Dec. 7-9—American Institute of Mining & Metallurgical Engineers, electric furnace steel conference, Hotel William Penn, Pittsburgh.

1956

Feb. 16-17—Southeastern Regional Foundry Conference, sponsored by Birmingham and Tennessee Chapters, AFS, Tutwiler Hotel, Birmingham.

Mar. 7-8—Foundry Educational Foundation, college-industry conference, Hotel Cleveland, Cleveland.

Mar. 19-20—Steel Founders' Society, annual meeting, Drake Hotel, Chicago.

May 3-9—American Foundrymen's Society, annual convention and exhibition, Convention Hall, Atlantic City, N. J.

May 8-11—American Welding Society, spring meeting and 4th welding and allied industry exposition, Buffalo.

June 5-8, Materials Handling Institute, materials handling exposition, Public Auditorium, Cleveland.

More and more foundrymen are using *Moly*. They like Moly's 3 Advantages:

ABUNDANT • • At Climax's Colorado mine, there's enough molybdenum to supply all the free world's needs for at least 35 years at the present rate of consumption.

EASY TO USE • • Moly can be added to most grades of cast iron without changing character of charge, normal melting practice, or the base metal. No balancing is necessary. Moly is neither a graphitizer nor a strong carbide former. Moreover, effective additions are so small they can be made at the spout or in the ladle because the cooling effect on the iron is insignificant.

EFFECTIVE • • Moly not only adds strength to a casting but can do more. You can get:

Strength plus toughness

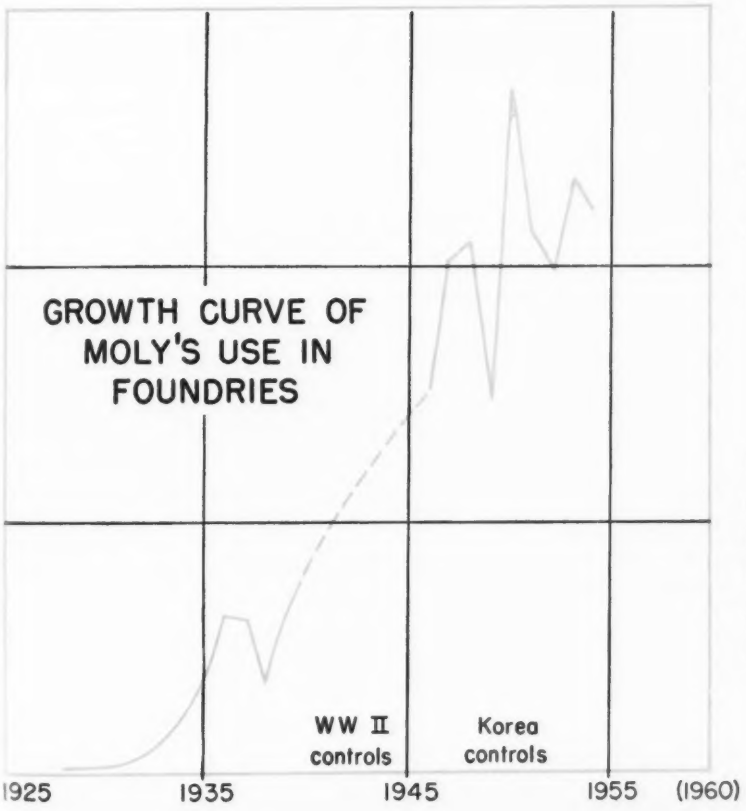
Strength plus growth resistance

Strength plus response to heat treatment

Strength plus wear resistance

Strength plus elevated temperature properties

Strength plus uniformity in heavy and varying sections



For engineered castings — get better results with Moly. If you would like to add your name to our mailing list for a series of leaflets on Moly Iron — address Dept. 20, Climax Molybdenum Company, 500 5th Avenue, New York 36, N. Y. The first leaflet is now ready for you. Write today.

MS5-15

CLIMAX MOLYBDENUM

we went "whole hog" with HANDY SANDY and REDDY SANDY

Reddy Sandy serving as automatic shake-out and sand conditioning unit.

Showing how 3 Handy Sandys and Reddy Sandys have simplified molding and set-out operations.

...and it paid off

"When our foundry was improved recently, we did not stop at halfway measures," states Mr. Elmer E. Lundquist of the Lake City Foundry Co., Chicago, Illinois. "Newaygo equipment looked so good to us that we decided to take full advantage of the obvious time, labor and cost saving features.

"Previous to remodeling, our molding machines were on one side of the shop and the bench molders on the other, with two sets of overhead cranes running the length of the shop. Pouring crucibles were picked up by either right or left hand cranes and brought to the molds. Now, all three Handy Sandy's and Reddy Sandy's as well as the bench molders are on one side of the shop, and one 'overall' crane takes the metal to any place in the foundry without any transfer procedure.

"The molders no longer have to carry each complete squeezer mold to its pouring location. Now, he simply turns around and places the mold on the rails and rolls it down the length of the set-out. Naturally, the molders are very pleased with the new sand handling arrangement. They expend less energy per mold and without carrying molds down to pouring locations, they have increased their output at least 20% over previous methods."

The Lake City Foundry Co., Inc. was founded in 1920 by Karl Lundquist, a foundryman since the age of 12. The original foundry, producing mainly jobbing and intricate pattern castings, grew under his capable guidance. In 1930 he was joined by his son Arnold and in 1942 when Karl retired, another son, Elmer, joined the foundry.

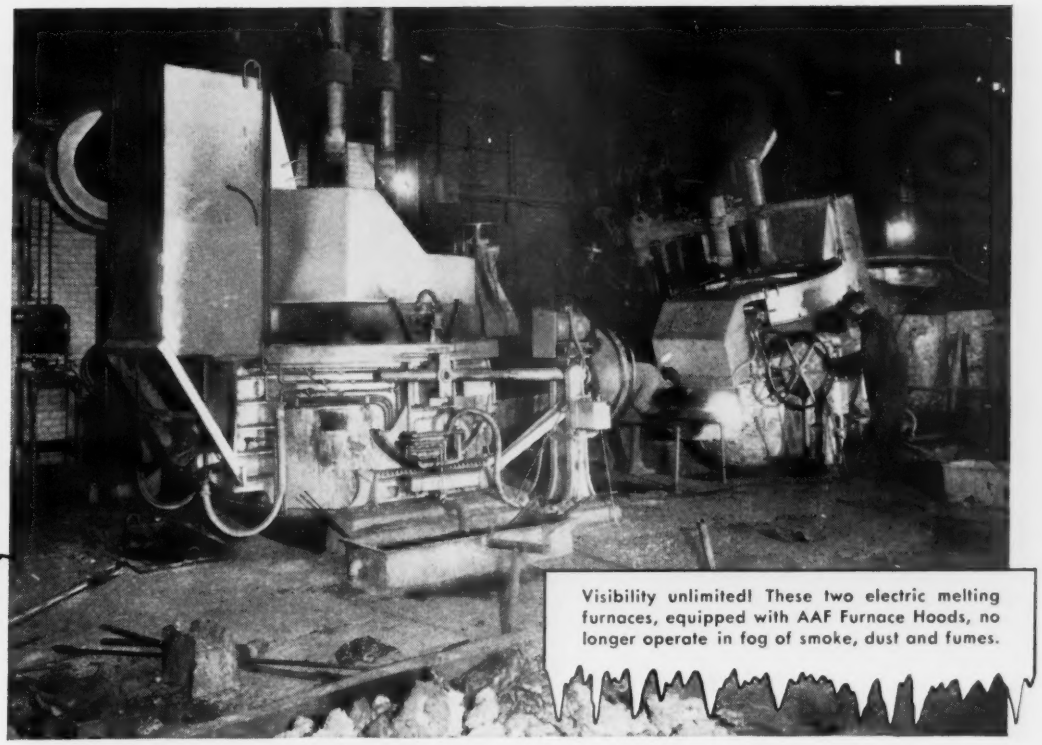
In 1946 the present modern plant at 2324 West Fulton Street was put into operation for the volume production of aluminum, bronze and copper castings. The Lundquists have always maintained high quality castings with each job getting their personal attention.

Mr. E. Long is the Plant Superintendent and Mr. R. Peterson is the Foundry Engineer.

A copy of "Planned Mechanization for Foundries" is yours for the asking. Write, wire, or phone

NEWAYGO engineering company
NEWAYGO, MICHIGAN
Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning Equipment

Muzzle those Electric Furnaces before WINTER comes!



Visibility unlimited! These two electric melting furnaces, equipped with AAF Furnace Hoods, no longer operate in fog of smoke, dust and fumes.

AAF Furnace Hood-AMERjet combination frees foundry of irritating "furnace fog"

WINTER only serves to accentuate the nuisance of electric melting furnace fumes, dust and smoke. With doors and windows closed, these irritants are then "bottled up" to further reduce efficiency and impair visibility. The solution for this winter—and every season of the year—is that proven foundry combination consisting of AAF Furnace Hood and AMERjet Fabric Dust Arrester.

AAF Furnace Hoods have been designed for all makes of electric melting furnaces (top and side charge) from ½ to 75-ton capacity. The circular hood is attached to the furnace roof ring to permit full operation without hindrance. Metallic fumes and dust are removed at their source, permitting complete foundry ventilation with minimum movement of air and use of power.

Collector for this service is today's most modern reverse jet type fabric dust arrester—the AAF AMERjet. This unit—designed especially for handling gases with fine particles—combines high collection efficiency with small space requirements, maintained performance over a wide range of operating conditions and constant exhaust volume.

Scores of electric furnaces operate "in the clear" today because of AAF fume and dust control. A call to your local AAF representative will bring complete facts promptly. Now is the time to clamp down the lid on "furnace fog".

AAF herman nelson

American Air Filter
COMPANY, INC.

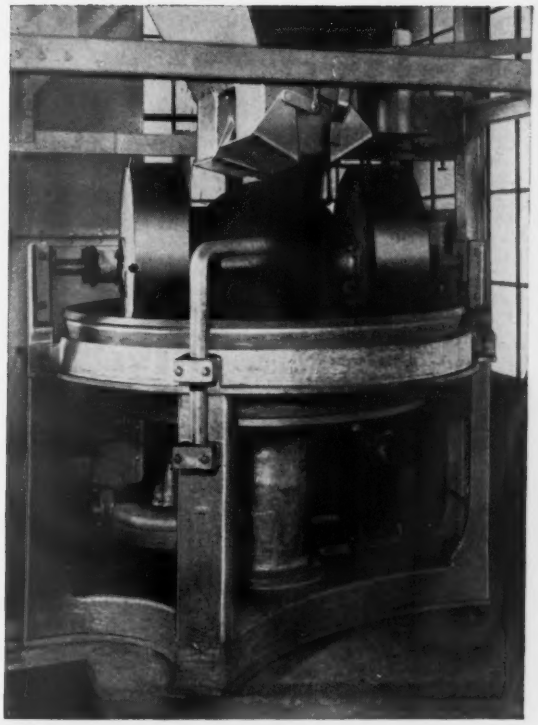
American Air Filter of Canada, Ltd., Montreal, P. Q. • 266 Central Avenue, Louisville 8, Kentucky

32 pages; 92 pictures and sketches

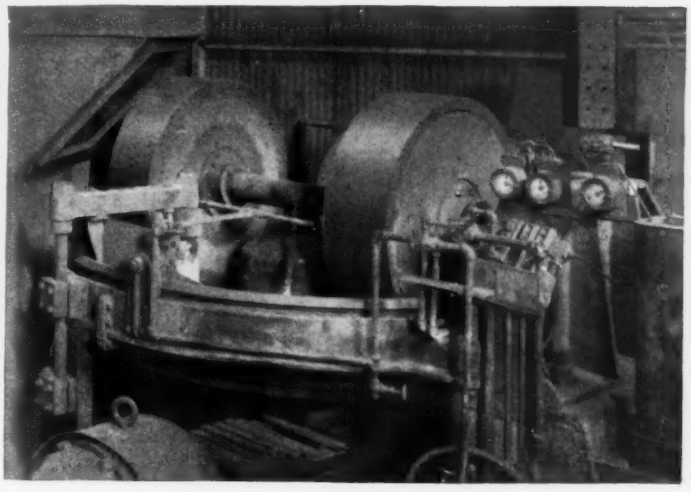
You belong in this picture

An evening with this interesting booklet will bring you the fascinating story of alloys and what they do for today's better steels and irons. For your copy of "Hot-Metal Magic," write to Electro Metallurgical Company, a Division of Union Carbide and Carbon Corporation, Room 354, 30 East 42nd Street, New York 17, N. Y. In Canada: Electro Metallurgical Company, Division of Union Carbide Canada Limited, Welland, Ontario.

the *Clearfield* mixer



speeds up your sand preparation



Increased speed and thoroughness in sand tempering is a reality with Clearfield Mixers. A revolving pan with vertically rotating mullers, stationary in the horizontal plane, exert a rapid twisting, sliding movement, actually rubbing the bond on the sand grains. In doing this, CLEARFIELD MIXERS substantially reduce the tempering period and cut costs by speeding up operations.

Write today for Catalog No. 83. There is a Clearfield Mixer for every sand preparation requirement.

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Clearfield, Pennsylvania, U. S. A.

for KING-SIZE savings

specify Wheelabrator® Steel Shot

All abrasives look pretty much alike . . . but the way they perform is another story. Abrasive costs vary all over the lot. The only thing that doesn't change is the fact that Wheelabrator Steel Shot **costs less to use than ANY OTHER ABRASIVE.** It is the **KING SIZE BUY.**

Compare it to chilled iron. The savings are tremendous. Compare it to a malleablized abrasive. The savings are almost as great. Compare it to cut wire or to other steel shots. Wheelabrator Steel Shot still gives **KING SIZE SAVINGS.** It gives you these savings because it is produced to give **KING SIZE PERFORMANCE.** No other abrasive has such consistent hardness from pellet to pellet. No other abrasive has such uniform microstructure.

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1. Only Wheelabrator Steel Shot is produced to such exacting standards.
2. Only Wheelabrator Steel Shot is so carefully controlled for uniform quality.
3. Only Wheelabrator has such complete facilities for shot production.
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American WHEELABRATOR® *the most economical abrasive ever made*

AMERICAN WHEELABRATOR & EQUIPMENT CORP., 505 S. Byrkit St., Mishawaka, Indiana

Monsanto Profit Pictures

Shell molds bonded with Resinox 736 produce smooth-surface castings which need no grinding to eliminate fins.

Link-Belt Company reports: Sharper detail, smoother finish with **Resinox 736**

MONSANTO'S PHENOLIC RESIN HELPS DELIVER MORE GOOD CASTINGS PER TON OF METAL POURED

The superior performance of Resinox 736 has been demonstrated again in one of the nation's leading foundries.

In a three-year test at Link-Belt Company's Ewart plant in Indianapolis, Resinox 736 proved to have the right combination of properties to shell mold precision parts at fast production rates.

Molds bonded with various resins were compared for speed of investment, speed of cure, dimensional stability, tensile strength and resistance to heat shock. The experiments proved Resinox 736 did the job better than any other resin now available. Link-Belt reports getting castings with sharper detail and smoother finish. Machining costs are greatly reduced—often eliminated altogether.

With the economy and quality of shell molding depending so much on the resin used, it will pay *you* to specify Resinox 736.

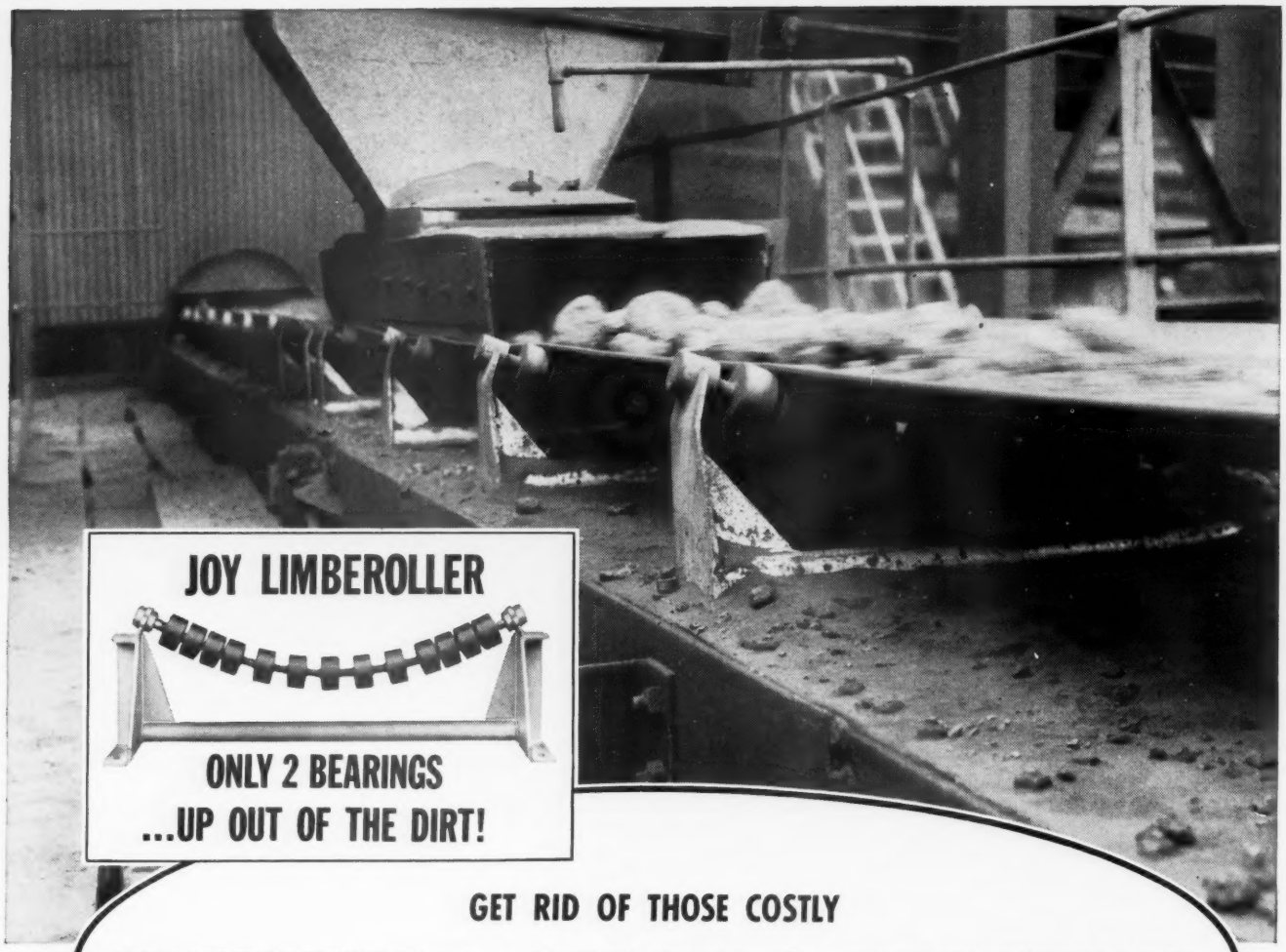
For a complete line of shell molding, core binding and sand conditioning resins that are research-developed and shop-tested to meet your needs, write to Monsanto Chemical Company, Plastics Division, Dept. FO-8, Springfield 2, Mass.

Sprockets cast by Link-Belt Co. in Resinox-bonded shell molds require no machining before threading.

MONSANTO®

For Stronger shell molds, specify

RESINOX®



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CONVEYOR BEARING TROUBLES

CAUSED BY DUST AND GRITTY SAND, ETC.

The Joy Limberoller idler consists of neoprene discs molded on neoprene-covered flexible steel cable. It is suspended from two bearings, one on each end, *out of the dirt zone.* This distinctive design, field-proved by thousands of idlers already in service, averts fouled idler rolls—protects the belt from damage—reduces your maintenance to a fraction—*gives many times longer service life on dusty, gritty or corrosive jobs.*

OTHER ADVANTAGES, TOO . . . Joy idlers are self-training—they conform to the load with a cushioned grip which supports the loaded belt without slipping and reduces belt wear. They resist corrosion, abrasion, flame and grease—weigh ⅔ less than steel idlers, and handle bulk or packaged materials equally well. They're easily changed *without stopping the belt,* and compactly stored.

Whatever your belt conveyor job may be, let us help you to make it more efficient and economical. Joy Limberoller Idlers are available for belt widths of 18″, 24″, 30″ and 36″. You'll find them easier, faster and less costly to install, maintain, knock down and move than any other conveyor idler on the market. ● For more information, write ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Ltd., Galt, Ont.*

WRITE FOR COMPLETE DETAILS

Ask for free *Bulletin LD-103D.*

It gives complete information on the unique Limberoller Idler, and we'll be glad to supplement it with engineering assistance on your particular problem.

Consult a Joy Engineer

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NORBIDE®... *The Longest Nozzle Life You Can Buy*

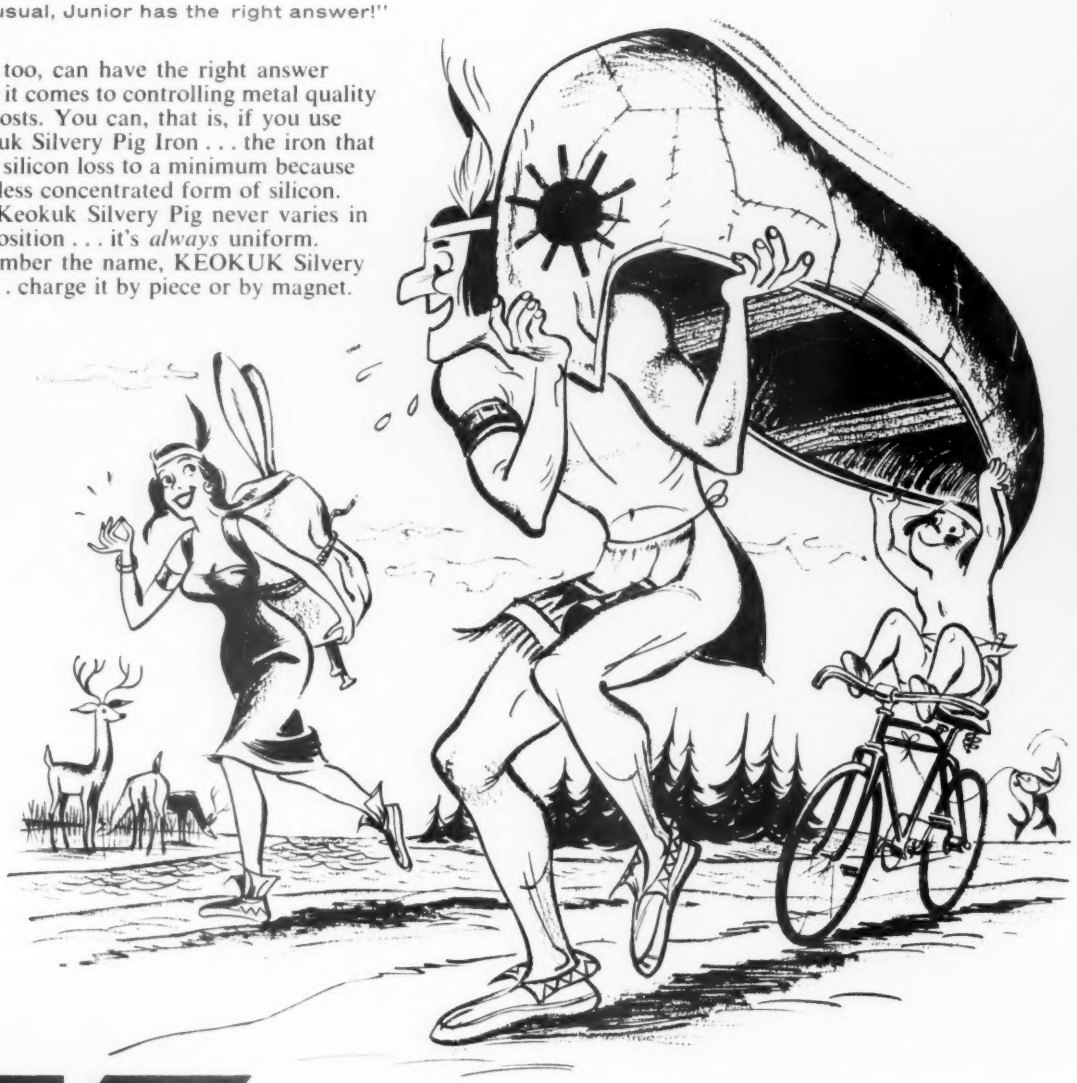
JUNIOR HAS THE ANSWER

[or why it pays to use KEOKUK Silvery Pig]

Chief Keokuk:
"Me show Little Chief how portage canoe cross country. Him heap lazy—run sitting down!"

Princess Wenatchee:
"As usual, Junior has the right answer!"

You, too, can have the right answer when it comes to controlling metal quality and costs. You can, that is, if you use Keokuk Silvery Pig Iron . . . the iron that holds silicon loss to a minimum because it's a less concentrated form of silicon. And Keokuk Silvery Pig never varies in composition . . . it's *always* uniform. Remember the name, KEOKUK Silvery Pig . . . charge it by piece or by magnet.



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Wenatchee Division, Wenatchee, Washington

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Keokuk Silvery . . . the superior form of silicon introduction . . . available in 60 and 30 pound pigs and 12½ pound piglets...in regular or alloy analysis. Keokuk also manufactures high silicon metal.

use 'dag' dry films for trouble-free lubrication

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DISPERSIONS®

Coat your molds with 'dag' Colloidal Graphite to get superior reproduction and smoother casting surfaces. Rejects are fewer; inspection time reduced.

The heat-resistant, low-friction, *dry lubricating film* provided by 'dag' dispersions improves parting and prevents damage to molds and castings. Clean separation reduces time-wasting preliminary finishing operations on the product. And because Acheson's exclusive process makes the graphite particles of **'dag'** Colloidal Graphite microscopically fine, the film left on the mold does not measurably alter dimensions of the casting.

'dag' Colloidal Graphite, dispersed in many carriers, can be used profitably to coat permanent molds, patterns, flask pins, shoulder screws, ladle interiors, chills, etc. You'll find a surprising number of ways to use 'dag' dispersions described in our free booklets on 'dag' Colloidal Graphite in the foundry, and 'dag' Colloidal Graphite as a parting compound. Write for Bulletins No. 425-S11 and No. 427-S11.

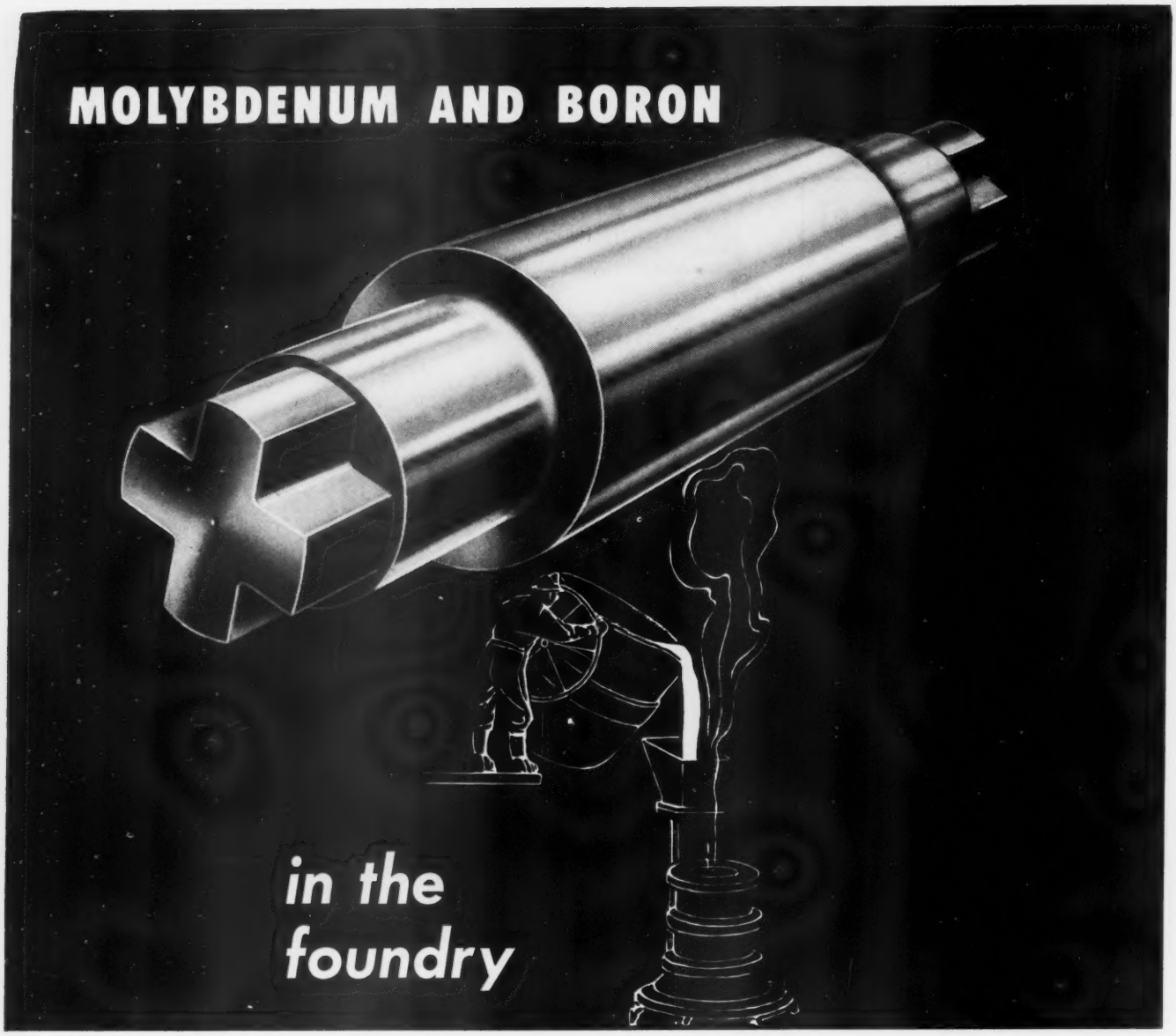
You can cut casting rejects and inspection time

Dispersions of molybdenum disulfide are available in various carriers. We are also equipped to do custom dispersing of solids in a wide variety of carriers.

ACHESON COLLOIDS COMPANY

PORT HURON, MICHIGAN

...also ACHESON COLLOIDS LIMITED, LONDON, ENGLAND



Rolls are among many cast, wrought iron and steel products that have been improved by Molybdenum and Boron. Very small additions, properly introduced, yield surprising results. MCA Molybdenum additions increase the resistance of rolls to breakage, chipping, heat checking and spalling in service. Molybdenum and Boron improve toughness and hardness qualities at both room and higher temperatures.

Similarly, Molybdenum and Boron are effective in improving toughness and hardness in both light and heavy iron and steel castings.

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When you use FRONTIER 40-E Aluminum Alloy!

• One of the most unusual features of Frontier 40-E Aluminum Alloy is the fact that the physical properties which spell high quality in the test bar appear uniformly throughout a large casting. And since Frontier 40-E is a non-heat-treated aluminum alloy, the high strength physical properties are obtained by natural aging at room temperatures. The high yield strength of Frontier 40-E Aluminum Alloy is of special value in designing parts that must be light in weight and yet resist distortion or deformation. If your products or parts would be better if they were lighter . . . you need Frontier 40-E Aluminum Alloy.

Here's Proof -

	TEST BAR	AXLE
Yield Strength	23,500	22,700
Tensile Strength	36,600	35,500
Elongation	7.5	7.5

OTHER PLUS VALUES

- Shock Resistance. Exceptional ability to withstand direct and transmitted shock.
- Corrosion Resistance. Even under stress.
- Machineability, Excellent.
- Fine grain withstands high pressure.
- Technical advice and service is available to designers and licensees.

Please send me a copy of the Alloy Data Book giving engineering and metallurgical facts on the physical properties of Frontier "40-E".

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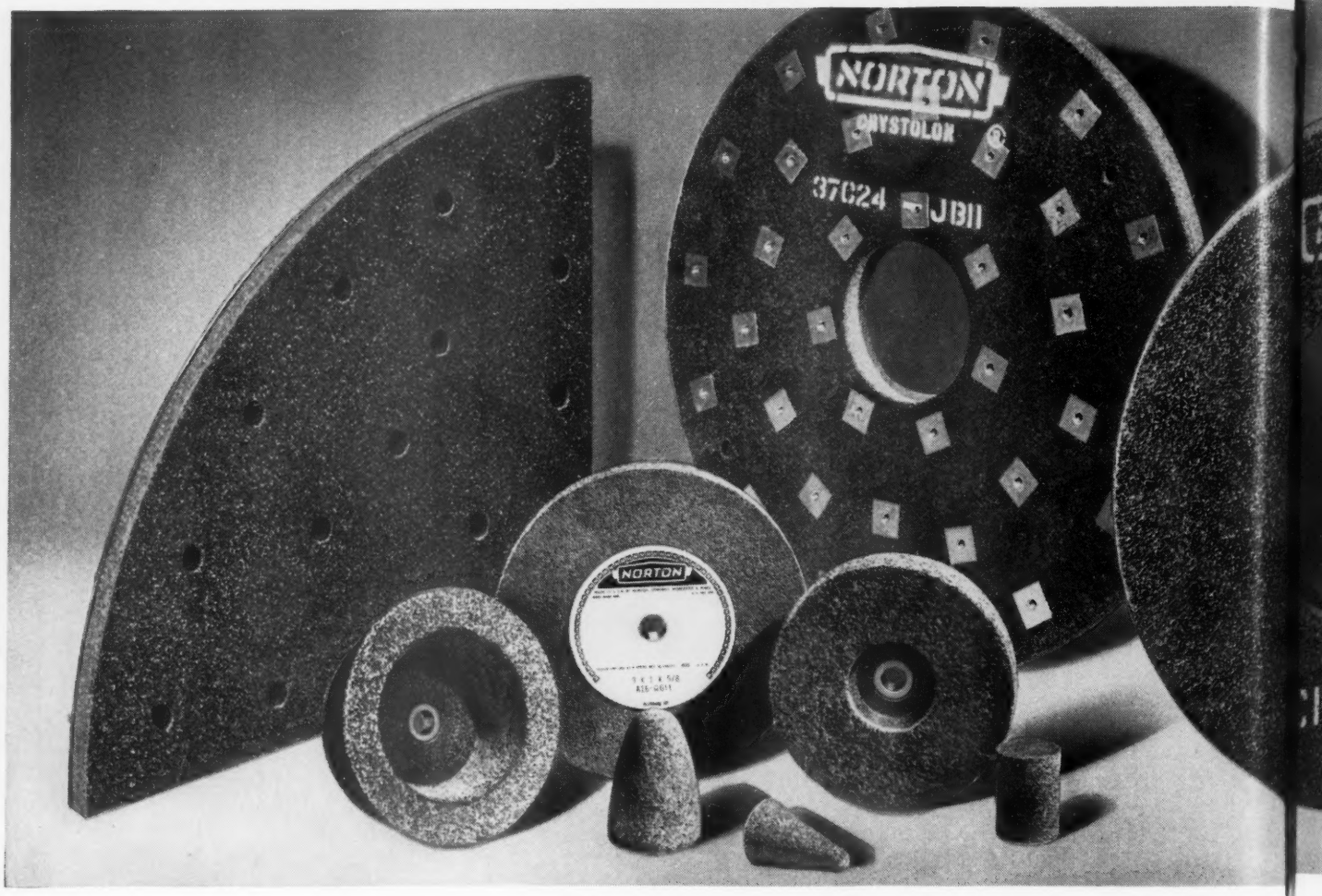


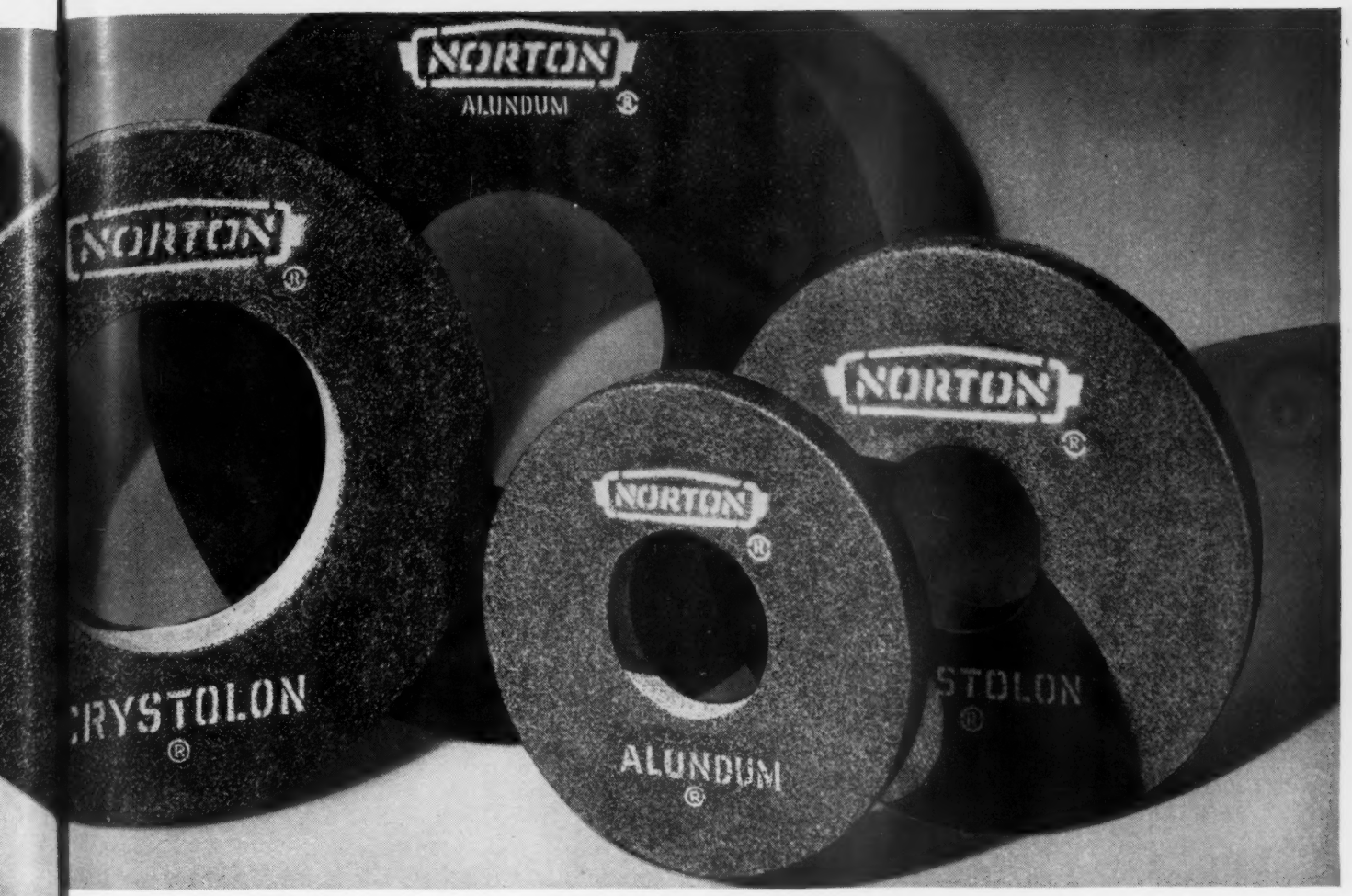
Announcing: The B-11 — a great new Norton resinoid bond

*Bringing new "TOUCH of GOLD" advantages to your snagging, **B11** wheels are more uniform, better balanced, easier to choose and to use*

Joining the list of famous Norton bonds that have made grinding wheel history, the new B11 resinoid offers unique advantages to a wide range of rough grinding applications, on all types of machines. Here's why:

New processing developments have resulted in wheels of extremely uniform structure bringing new standards of balance. As a result, B11 wheels "hug that work" closer, grind cooler and faster, with far less vibration and bounce. This more efficient grinding action means less operator-fatigue and longer wheel life.

In addition, you get closest possible duplication with B11 wheels. Hardness increments are evenly spaced throughout the entire grade scale. Since the one B11 bond includes a wide range of hardness grades, you no longer need to make the grade conversions required when changing from one resinoid bond type to another. And to make



it even easier for you to choose exactly the right wheel for every job, B11 wheels are available in half-grade increments. For example, where grade J is too soft and grade K too hard, you can specify grade J+ — which is exactly half-way between J and K.

How the "Touch of Gold" brings out hidden profits

B11 wheels are typical examples of how "Touch of Gold" performance is built into every Norton grinding wheel. In your own plant, they mean more value added to your products, more metal ground off per dollar, more time and money saved — important benefits that bring out the *hidden profits* in countless grinding jobs. And remember: only Norton brings you such long experience in both grinding wheels and machines to help you produce more at lower cost.

Your Norton Distributor

will gladly arrange test runs of the new B11 resinoid bonded wheels in your own shop. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass. W-1664

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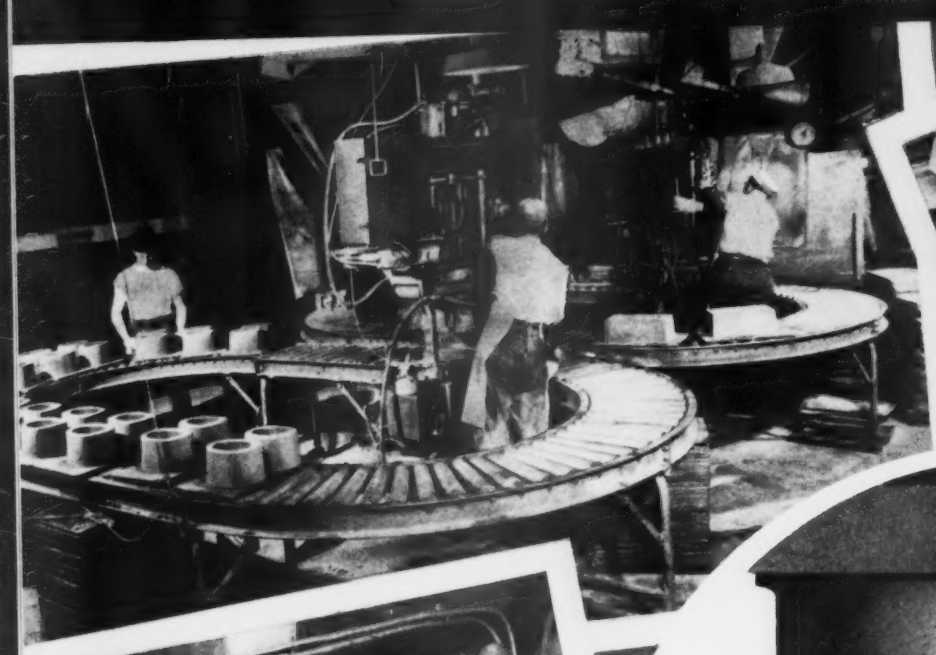
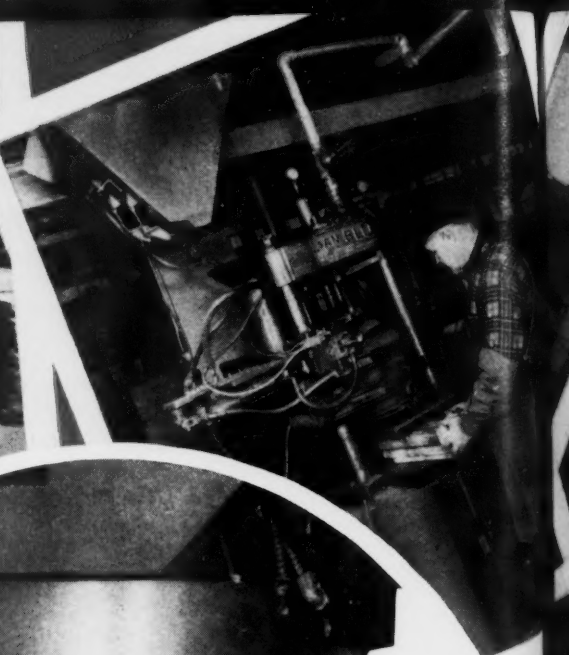
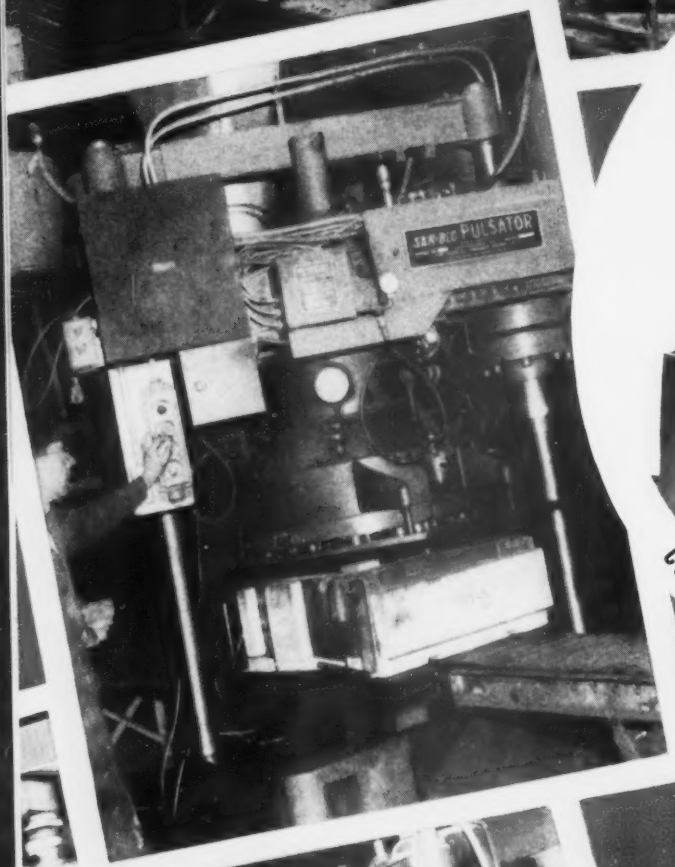
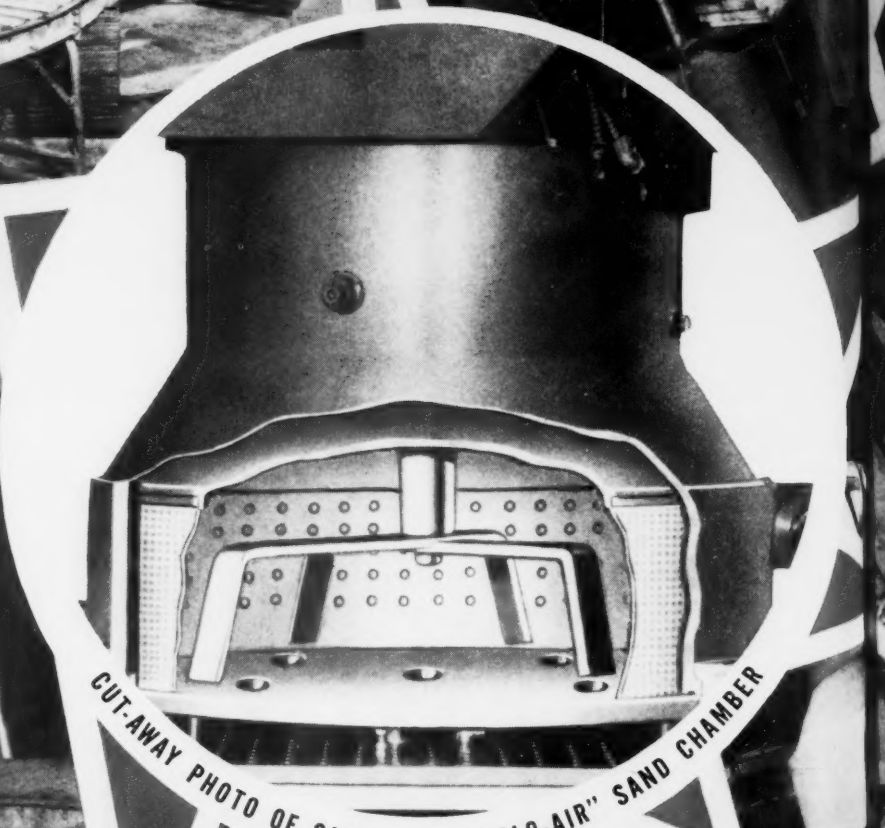
BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

1 out of 3









CUT-AWAY PHOTO OF SAN-BLO'S "CYCLO-AIR" SAND CHAMBER

B STEEL FOUNDRIES

are now using

SAN-BLO

CORE BLOWING MACHINES

Steel foundries originally had difficulty in blowing cores, because of the heavy, hard-to-blow sands they must use. Yet today, only a few years after SAN-BLO core blowing machines were first introduced, more than one-third of the steel foundries in this country are already using SAN-BLO core blowers. These foundries are producing quality cores on their SAN-BLO machines—using their regular core sands—and blowing cores in *wooden* as well as metal core boxes. This has all been made possible by the SAN-BLO's exclusive sand chamber design (shown on opposite page) which utilizes motor-driven plows and an aerating air circuit to "flow" sand from sand chamber to core box.

But, yours doesn't have to be a steel foundry to take advantage of the SAN-BLO's many exclusive features. No matter what your core blowing problems—chances are the SAN-BLO can solve them. Why not investigate? Write the SAN-BLO Division for full information.

FEDERAL

San-Blo Division

The **FEDERAL FOUNDRY SUPPLY** *Company*

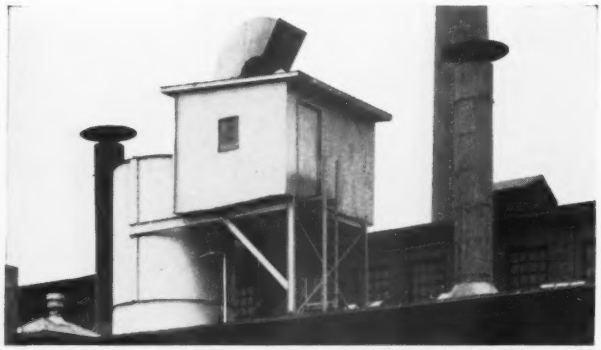
4600 EAST 71st STREET, CLEVELAND 5, OHIO

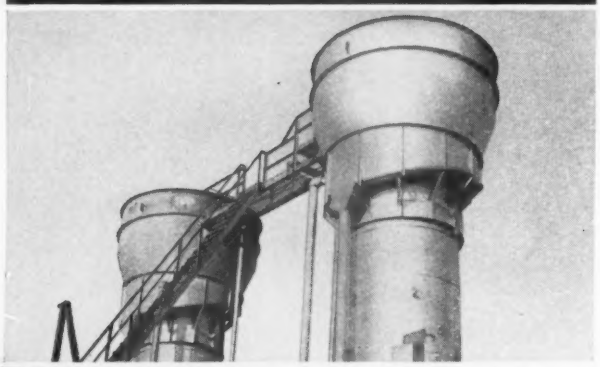
SALES OFFICES IN . . . CHICAGO . . . DETROIT . . . LOS ANGELES . . . MILWAUKEE . . . NEW YORK

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION MEMBER FEMA

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

Small foundries—too,
BUY SCHNEIBLE EQUIPMENT FOR BETTER DUST CONTROL!





The smaller foundries — too, are users of Schneible Dust Control Equipment. Like the large production foundries, they have found Schneible has the experience and the equipment best suited for all foundry dust control.

The Schneible line of Multi-Wash Collectors, Uni-flo Shakeout Hoods, Cupola Collectors and auxiliary units has been designed with all types and sizes of foundries in mind.

If you are considering any dust control equipment *be sure* to include a quotation from Schneible. You'll be offered equipment that suits your requirements at a price that is within your budget.

Contact the local Schneible representative or write or phone direct for detailed information.

SCHNEIBLE

Cable Address: CBSCO
European Licensee: Elex S. A., Zurich, Switzerland

CLAUDE B. SCHNEIBLE COMPANY
P. O. Box 81, North End Station • Detroit 2, Michigan

PRODUCTS

Multi-Wash Collectors • Uni-Flo Standard Hoods • Uni-Flo Compensating Hoods • Uni-Flo Fractionating Hoods • Water Curtain Cupola Collectors • Ductwork • Velocitrap • Dust Separators • Entrainment Separators • Settling and Dewatering Tanks • "Wear Proof" Centrifugal Slurry Pumps

Late News

FOUNDRY TRAINING: A meeting of foundry industry and government representatives was held at the Department of Labor, Washington, July 20, to discuss training problems in the industry. Present from industry were Cal C. Chambers, Texas Foundries Inc., Lufkin, Tex.; W. J. Klayer, Aluminum Industries Inc., Cincinnati; Fred G. Sefing, International Nickel Co., New York; B. C. Yearley, National Malleable & Steel Castings Co., Cleveland; H. F. Scobie, *Modern Castings*, Chicago; and Frank G. Steinebach, FOUNDRY, Cleveland. Government representatives participating include E. R. Chappell, special assistant to the Secretary of Labor, and the following from the Bureau of Apprenticeship: W. C. Christensen, deputy director of operations; William J. Moore, assistant director; John S. McCauley, chief, Branch of Research and Statistics; and Richard B. Brown, field representative, New York. As the first step in developing a program of foundry training, the department will study a representative number of mechanized foundries to determine present use of certain types of trained men, training methods and predicted future needs.

NCC ELECTS: William L. Leopold, Northern Bronze Co., Philadelphia, and president, Non-Ferrous Founders' Society, was elected president, National Castings Council, at the annual meeting held in Cleveland, July 15. Bruce L. Simpson, National Engineering Co., Chicago, and president, American Foundrymen's Society, Chicago, was named vice president. F. Ray Fleig, Smith Facing & Supply Co., Cleveland, representing the Foundry Facing Manufacturers' Association, was re-elected treasurer. Frank G. Steinebach, FOUNDRY, Cleveland, was re-elected secretary.

ALUMINUM CASTINGS: According to the Aluminum Association, production of aluminum castings in May by association members and reporting members of the American Die Casting Institute totaled 32,924,339 lb, compared with 33,897,850 lb in April and 21,722,194 lb in May 1594. May 1955 production was divided as follows: Sand, 1,759,180 lb; permanent mold 14,564,418 lb and die casting 16,600,741 lb. A total of 98 companies is included in this report.

CASTINGS BRANCH: Years of effort were required to separate castings from forgings in the minds of some government people, and to secure the establishment of a Castings Branch in the Iron & Steel Division of BDSA. Now many of the foundrymen who labored on that project are wondering why some people in that agency reportedly want to attach the powdered metals industry to the Castings Branch.

STOPS MAKING CASTINGS: Builders Iron Foundry Division, B-I-F Industries Inc., Providence, R. I., will discontinue its foundry operations about Oct. 28. The company will continue with its line of melting, controlling and blending equipment and will buy its castings.

PURCHASES FOUNDRY: Grede Foundries Inc., Milwaukee, has purchased the Elkhart Division of the Chicago Hardware Foundry Co., Elkhart, Ind. The plant will specialize in the production of small gray iron castings. This becomes the seventh division of Grede Foundries.

1957 AFS CONVENTION: The annual 1957 technical meeting of the American Foundrymen's Society has been scheduled for Cincinnati, May 5 to 9. As previously reported, the 1956 AFS Foundry Show and Convention will be held in Atlantic City, May 3 to 9.

PERSONALS: A. Rasmussen has been appointed sales manager, LaPorte Foundry Co., LaPorte, Ind. . . . J. A. Dean has been promoted to manufacturing manager and E. F. Hines has been named foundry manager, Nelson Electric Mfg. Co., Tulsa, Okla. . . Earl W. Beyerlein has been made casting buyer, Axle Division, Cleveland, and Forging Division, Marion, O., of Eaton Mfg. Co. . . Carl E. Rowe has been made vice president in charge of manufactur-

ing and William J. Brinkman, vice president in charge of engineering, Pressco Castings & Mfg. Corp., Chesterton, Ind. . . Fred Zajac has been made Detroit service engineer, Acheson Colloids Co., Port Huron, Mich. . . Robert J. Sudlow has been appointed district representative for the New England states for the Frank G. Hough Co., Libertyville, Ill. . . Hugh J. McKane, Atlanta, has been promoted to district manager, southern area, Bay State Abrasive Products Co., Westboro, Mass. . . Robert Duffy is the new district manager of the Milwaukee sales territory, Lindberg Engineering Co., Chicago . . . Norton Co., Worcester, Mass., has appointed John W. Wheeler, abrasive engineer for the western Massachusetts area . . . John P. McGury has joined the staff of the National Foundry Association.

OBITUARY: Homer Britton, vice president, Cleveland Foundry Co., Cleveland, died July 15 . . . Harold L. Martin, president and general manager, Atlas Foundry & Mfg. Co., Richmond, Calif., died June 29 . . . Peter Soffel, president, Pittsburgh Metals Purifying Co., Pittsburgh, died July 9.

LILLIEQVIST AWARD: Steel Founders' Society of America has established the Gustaf A. Lillieqvist Steel Foundry Facts Award in honor of the late Dr. Lillieqvist, formerly director of research, American Steel Foundries, and for many years intimately associated with society activities as a member of its Technical and Research Committee.

BUYERS' GUIDE: A revised and enlarged Buyers' Guide for Nonferrous Castings has just been published by the Non-Ferrous Founders' Society. The guide is one means used by the society to make the facilities of the nonferrous foundry industry known to the United States government.

STEEL FOUNDRY: Structural steel for the new steel foundry of Texas Foundries Inc., Lufkin, Tex., was being erected the week of July 18. Operations are exepected to start late in October.

PLANT ADDITION: Continental Foundry & Machine Co., East Chicago, Ind., is making additions to its Wheeling, W. Va., plant.

Prices of Foundry Metals and Coke

(As of July 25, 1955)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$16.50-17.00
OVEN	
Birmingham	$22.65
Buffalo	25.00
Chicago	24.50
Detroit	25.50
Erie, Pa.	25.00
Indianapolis	24.25
Kearny, N. J.	24.50
Lone Star, Tex.	18.50
Milwaukee	25.25
Montreal, Que.	26.25
New England, deld.	26.05
Painesville, O.	25.50
Philadelphia	24.00
Portsmouth, O.	24.00
St. Louis, del.	26.00
St. Paul	24.25
Swedeland, Pa.	24.00
Terre Haute, Ind.	24.05

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$61.00	$61.50
Birmingham	55.00	....
Buffalo	59.00	59.50
Chicago	59.00	59.00
Cleveland	59.00	59.00
Duluth	59.00	59.00
Erie, Pa.	59.00	59.00
Everett, Mass.	61.00	61.50
Fontana, Calif.	62.50	....
Geneva, Utah	59.00	....
Granite City, Ill.	60.90	61.40
Lone Star, Tex.	52.50	52.50
Neville Island (Pittsburgh)	59.00	59.00
Steelton, Pa.	61.00	61.50
Swedeland, Pa.	61.00	61.50
Toledo, O.	59.00	59.00
Troy, N. Y.	61.00	61.50
Youngstown, O.	...	59.00

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 37.50; tin bronze, No. 225, 49.50; No. 245, 42.75; high-leaded tin bronze, No. 305, 40.75; No. 1 yellow, No. 405, 31.75; manganese bronze, No. 421, 34.75.

ALUMINUM: 99 per cent plus primary ingots 23.20. Secondary No. 12 alloy 26.50-27.50. Deoxidizing grades: No. 1 26.50-29.00; No. 4 24.00-26.00.

MAGNESIUM: 99.8 per cent notched ingots 29.25, f.o.b. Freeport, Tex. (10,000 lb or more).

COPPER: Electrolytic 36.00 delivered Connecticut valley.

ZINC: High grade 13.85, delivered. Die casting alloy No. 3 16.50, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$32.00-33.00	**$45.00-46.00	.....	.....	.....	.....	$44.00-46.00
Boston*	**31.00-32.00	**28.00-29.00	.....	.....	**33.00-34.00	.....	.....
Buffalo	34.00-35.00	**37.00-38.00	.....	.....	**42.00-43.00	.....	44.00-45.00
Chicago	38.00-40.00	45.00-46.00	.....	49.00-50.00	49.00-50.00	49.00-50.00	53.00-55.00
Cincinnati*	**35.00-36.00	**42.00-43.00	**35.00-36.00	.....	**46.00-47.00	.....	**47.00-48.00
Cleveland	38.00-39.00	45.00-46.00	35.00-36.00	47.00-48.00	46.00-47.00	48.00-49.00	51.00-53.00
Detroit*	**32.00	**39.00	**32.00	**42.00	.....	**35.00	.....
Los Angeles	32.00	**43.00-45.00	.....	.....	.....	.....	.....
New York*	36.00-37.00	32.00-33.00	35.00-36.00	.....	.....	.....	.....
Philadelphia	42.00	36.00	43.00	.....	45.00	45.00	.....
Pittsburgh	39.00-40.00	39.00-40.00	34.00-35.00	.....	43.00-44.00	.....	49.50-51.50
St. Louis*	32.00	41.00	35.00	43.00	.....	.....	48.00
San Francisco	32.00	40.00-43.00	36.00	39.00	48.00	.....	.....
Seattle	33.00	**36.00-40.00	**28.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point

For Cleaner Surfaces, Better Shakeout, Try WHITEHEAD'S NEW LYQUAFLOUR

Our new plant has just been completed at Irwin, Penna., to produce the new DOUBLE-STRENGTH LYQUAFLOUR. This compound of a special hydrocarbon and woodflour improves castings and mold conditions for all types of metals. Highly recommended for the advantages listed below:

- One sand additive controls both peel and expansion
- Good shakeout saves sand
- Imparts highest flowability to sand mixture to give pattern true finish
- 2% initial treatment of sand and as little as ¼ of 1% to reactivate does the job
- Replaces any carbon or hydrocarbon materials now used
- Eliminates dust at the muller
- Castings peel excellently which reduces cleaning room time
- Reduces penetration and burn-on
- Overcomes sand expansion defects, maintains good compression strength
- Improves molding, "feel", and "moldability"
- No rigid control required
- Permits hard ramming
- Less ramming required, more molds per hour
- Less temper water needed

Whitehead Brothers COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
17 Exchange Place, Providence, R. I.

Manufacturers of

LYQUAGRIP
Ready-to-use core paste

JOINT SEAL
Plastic compound for perfect sealing

LYQUAFACE
The liquid sand grain coating

DOB-IT
Ready-to-use core mudding compound

COVER GREATER SURFACE AREA

GET... *Smoother... Cleaner...* CASTINGS *at lower cost!*

...WITH

DELTA SUPERKOAT WASH

Delta Superkoat Wash is recommended for Steel, Gray Iron, Malleable and Non-Ferrous castings. It's easy to mix and apply uniformly to green or dry sand and baked surfaces by dipping, swabbing, spraying or brushing.

Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

NOTE THESE IMPORTANT ADVANTAGES OF DELTA SUPERKOAT WASH:

1. **NO PRECIPITATION OR SETTLING —** When thoroughly mixed, wash will stay in suspension indefinitely.
2. **EASY TO APPLY —** It can be dipped, swabbed, brushed or sprayed on green or dry sand and baked surfaces.
3. **RAPID, DEEP PENETRATION & EXCELLENT ADHESION —** Quickly anchors itself 5 to 7 grains deep in sand surfaces.
4. **NON-REACTIVE — LOW GAS —** Will not react or produce gas in contact with molten metal.
5. **REDUCED CLEANING COSTS —** Cast surfaces are smoother and castings are cleaner.
6. **WILL NOT FLAKE —** When completely dried, the wash is thoroughly bonded to the sand surfaces.
7. **HIGHLY REFRACTORY —** Has an unusually high fusion point.
8. **ELIMINATES SAND FUSION AND BURN-IN —** Flowing metal will not crack or rupture wash during pouring.
9. **ECONOMICAL TO USE —** Covers a greater surface area at a lower cost per pound of wash.

DELTA

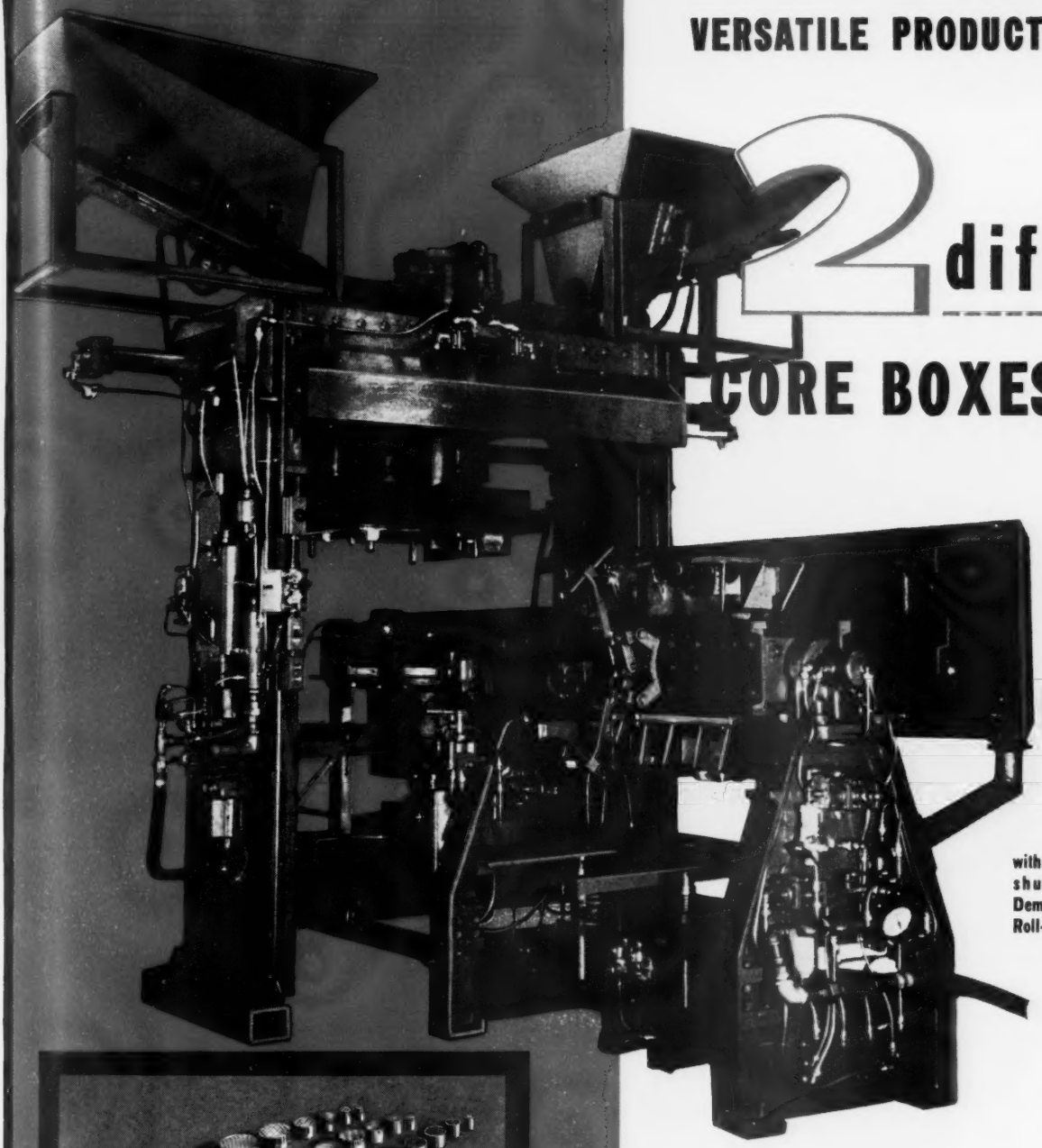
DELTA OIL PRODUCTS CO.

MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

MILWAUKEE 9, WISCONSIN

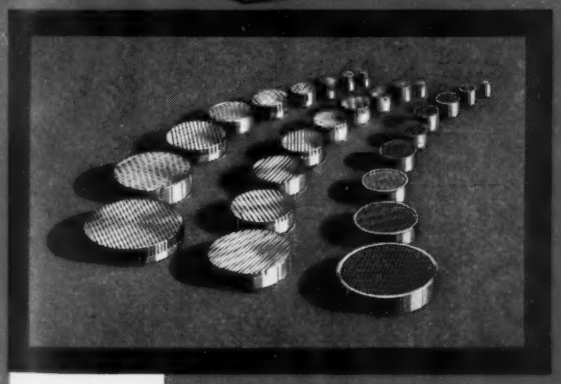
VERSATILE PRODUCTION BOOSTER

2 different CORE BOXES at once



DEMMLER MODEL 3T TWIN MAGAZINE CORE BLOWER

with automatic core box shuttle device and Demmler No. 7 Double Roll-Over Draw Machine.



HL 150 MESH

Demmler Core Box Vents

It makes good sense to buy core box vents from the company that pioneered the manufacture of core blowers. Demmler engineers are constantly improving vent design and developing new types. For example, the new HL 150 mesh vent is a special design for various applications including D-Process shell molding.

WRITE FOR LITERATURE

This machine handles two different core boxes, blowing each core box separately. It has two magazines and two automatic vibratory sand feeders which permit the running of two different types of sand mixtures at the same time! The fully automatic, one-man operation gives production rates up to 300 cores per hour. The 3T is a fast and versatile example of Demmler engineering!

There are three well known reasons for consulting Demmler about core blowers. 1. Demmler has over 45 years' experience building core blowers, 2. Demmler machines lead in high production, and 3. Demmler construction and design has proved it offers lowest maintenance. Call in a Demmler engineer next time you have a core blower problem.

Wm. Demmler & Bros.

KEWANEE, ILLINOIS

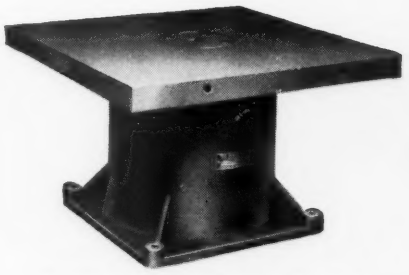
It's the low-cost producer who makes the profit

PROFIT—as most foundrymen will tell you —is a pretty elusive thing.

But more often than not, it's just a matter of taking a hard look at the *facts.*

- The man who looks into the reasons why *his* manufacturing costs are higher than competition's . . . why he's not closing as many orders as he might, often finds the answer in *equipment.*
- It doesn't take much figuring to show you that a low-cost investment in modern foundry equipment knocks the edge off lost production time, cuts unit cost to rock bottom.

Let us spell out for you how easy it is to be a low-cost producer — how pay-for-themselves Tabor machines let *you* set the price, get the order, make the profit. Talk to a Tabor engineer—there's no obligation. Or write for our Catalog.



TABOR JARRING MACHINES
Plain *or* Shockless

Tabor manufactures a complete range of plain *or* shockless jarring machines. Capacities are upward from 300 pounds, with standard or special table sizes. High speed, strength, design simplicity and low operating costs are keynotes of these machines — products of Tabor's more than 70 years of foundry knowledge. Pictured is standard plain model B-6, with a capacity of 1500 pounds operating from plant air pressure (80 lbs.). Table size is 36"x36".

Flask Lift Machines • Squeezers and Jar Squeezers
Jarring Machines • Rollover Machines
Abrasive Cut-Off Machines • Vibrators

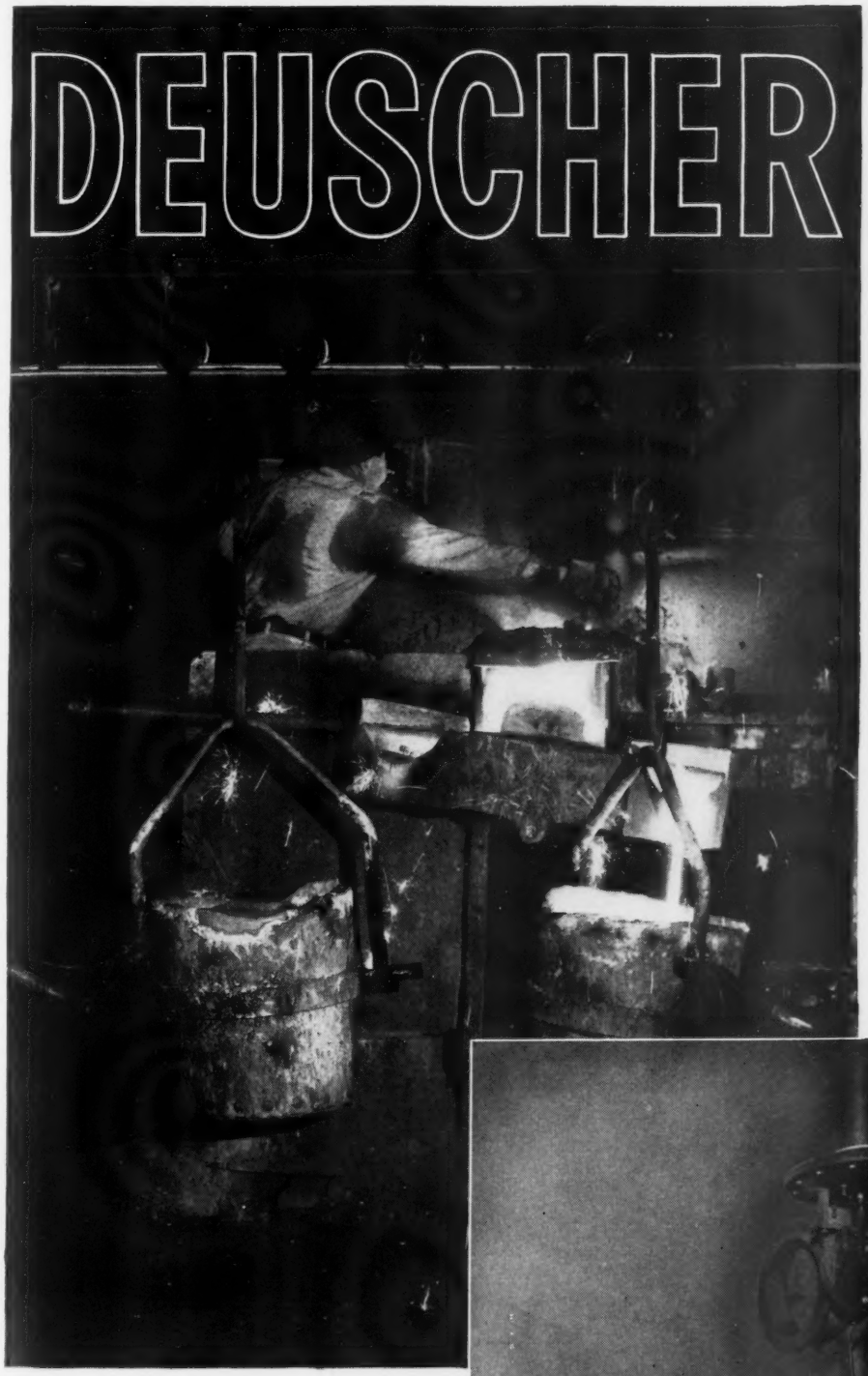
The TABOR TRADE 1884 MARK Manufacturing Co.

Division of
TURBO MACHINE COMPANY
LANSDALE, PA.

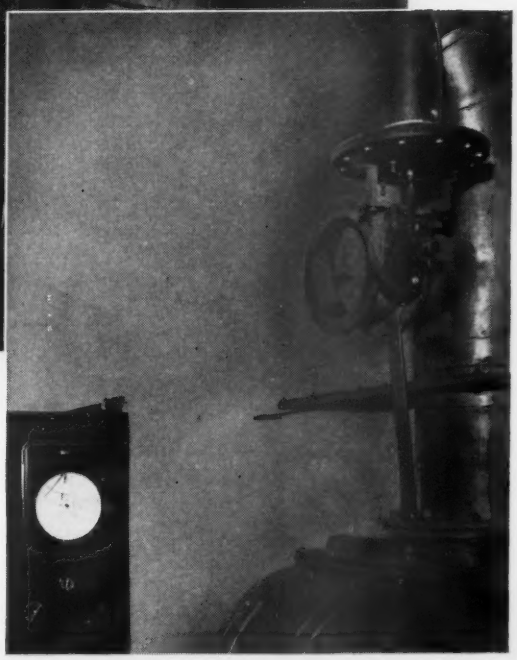
DEUSCHER FOUNDRY

Cuts Chilling Losses

...through Foxboro Air Weight Control



"When we operated our cupola without control of air weight, we had trouble holding proper metal temperatures throughout the heat. Combustion varied, spout temperatures varied, and we were rejecting too many light castings because of hard edges. Since we put Foxboro Air Weight Control on cupola blast, our chill tests are much more uniform, rejects are way down, and we don't have any oxidation difficulties."

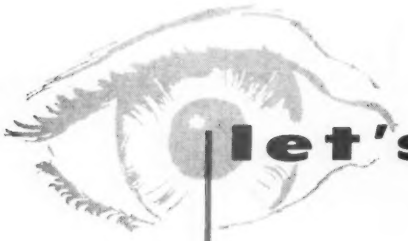


Accurate control of combustion air for any melting requirement is easily set on Foxboro Air Weight Control Panel at the Deuscher Company. Controller actuates air motor on vent-valve. (On centrifugal systems, controller regulates valve in blast line.)

This report from Mr. Stanley F. Levy, Operations Manager of the H. P. Deuscher Company, Hamilton, Ohio, is typical. Foxboro Air Weight Control "weighs" air . . . automatically corrects for atmospheric changes. No matter what the weather, coke charge *always* gets the right amount of oxygen for best combustion — uniform melting — better castings. For full details, ask your nearest Foxboro sales engineer, or write **The Foxboro Company, 328 Neponset Ave., Foxboro, Mass., U.S.A.**

FOXBORO REG. U. S. PAT. OFF. **AIR-WEIGHT CONTROLLERS**

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND



let's look at

a molding machine which is inexpensive to install . . .

one which will be in operation within 24 hours after delivery . . .

a molding machine which is shipped completely assembled . . .

a versatile unit that is simple to operate.

All of these features apply to the HERMAN molding machine illustrated here. And there's a lot more to be said about it, too . . .

1. Every operation on the 1500 Pound Jolt Rollover Machine is controlled by a single valve.
2. Your operator never has to leave the control stand.
3. A timer controls jarring action so that it stops automatically as soon as proper density is reached.
4. No jerking, bucking, jumping or slamming in rollover and draw action. Hydraulic operation is slick, smooth and steady.
5. Perfect draws are assured by an automatic equalizer which adjusts itself to all irregularities.
6. Finished mold or core is deposited directly on the conveyor.

Hundreds of these HERMAN 1500 Pound Jolt Rollover Machines installed in foundries, here and abroad, are proof of their ability to do a job for you.

the HERMAN 1500 pound high-speed jolt rollover machine

Why don't you get in touch with us right now for more information. Write for our catalog No. GC-11-53.

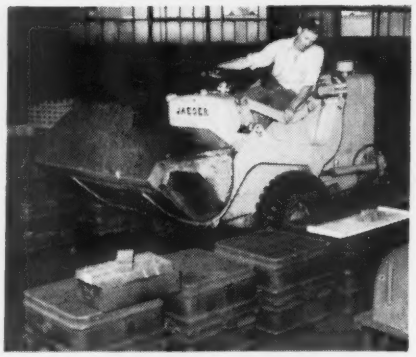
HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

HERMAN

Best Known Name in Molding Machines

In foreground, loading heap sand for transportation to magnetic conditioner. In background, delivering facing sand to molder.

Dumping heap sand into hopper of magnetic conditioner. The fast-loading, fast-traveling, fast-discharging Auto-Scoop moves more loads per hour, speeds production.



A load of facing sand on its way to a molder. Runway is defined by banks of molds. Compact design of the Jaeger Auto-Scoop simplifies work in narrow aisles, cramped quarters.

Unloading facing sand into hopper at molding machine. Simple controls and full visibility enable operator to spot load accurately, dump fast or slow, discharge partial loads.

Jaeger Auto-Scoops cut handling costs in Darling foundry

. . move more materials, faster, than loaders previously used

Replacing other loaders of less advanced design, Auto-Scoops handle more materials, with less effort, and get around in the plant more easily, reports Darling Valve & Mfg. Co., Williamsport, Pa. They're worked 18 hours a day on all kinds of sand handling, and also bagged materials, castings, etc. Operators also say they like the Auto-Scoops much better than any loaders previously used.

Superior performance is achieved because the Jaeger Auto-Scoop is specially engineered for most efficient scoop loader operation. It moves up to 25% faster, turns in only 6'6" radius with bucket in carry position, dumps over edges to 6'8" high, reaches to 2'7" and easily handles loads to 1200 lbs.—all greater than comparable loaders. Lower bucket tilt-back and lower carry insure a full bucket, improved stability, faster travel and eliminate excessive traction crowding. Boom arms and bucket are under hydraulic control.

These are only a few of its features that contribute to overall gains in production. For more data and specifications, write for Catalog L12-4 and name of the Jaeger distributor nearest you.

For bigger work, Jaeger offers the 1 cu. yd. Load-Plus, with torque converter, power steering and either front-wheel or 4-wheel drive.

The Jaeger Machine Company, 502 Dublin Avenue, Columbus 16, Ohio

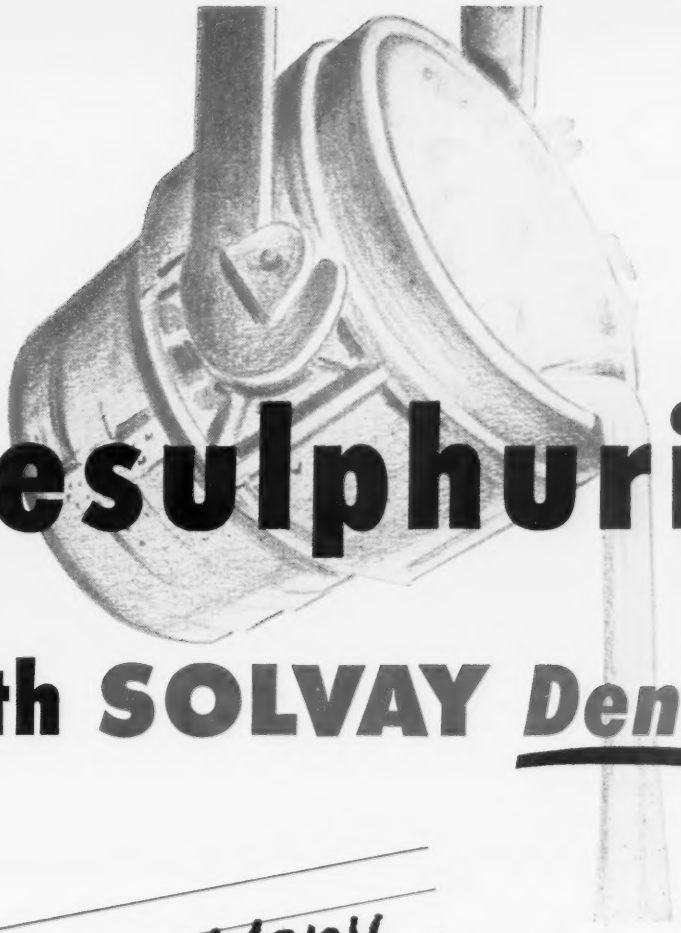
JAEGER LOAD-PLUS auto-scoop

AIR COMPRESSORS • PUMPS • MIXERS • PAVING MACHINES

Distributors throughout U. S. and Canada and Principal Cities of the World

Besides bulk handling, Auto-Scoops come in handy for handling bagged materials, drums, etc. Big lifting capacity and large bucket facilitate maximum loads.

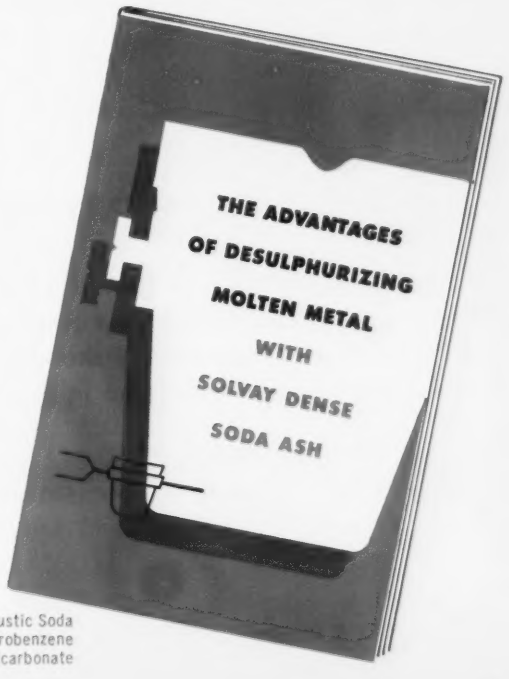
The Auto-Scoops are also used for transporting flasks and castings. An unusual additional application is to hoist maintenance workers to overhead lighting fixtures.



Desulphurization

with SOLVAY *Dense* Soda Ash

SOLVAY DENSE SODA ASH has gained wide acceptance for efficient desulphurization. This 100% active material helps produce better, more fluid metal . . . and gives you these other advantages: it's free-flowing; the small grains melt very rapidly, allowing faster, more uniform dispersion; and it's easily added by means of simple equipment. The use of Solvay Dense Soda Ash is a flexible one—you use only as much as you need. And remember, Solvay Dense Soda Ash is the LOW COST form of desulphurization!



Further Information Contained in Valuable Book—Available on Request*

"The Advantages of Desulphurizing Molten Metal with Solvay Dense Soda Ash" has been published by Solvay for the benefit of the foundryman. It contains important information on the advantages you can gain by desulphurizing with Solvay Dense Soda Ash. It also explains what type of equipment is needed and how to obtain it. This book is available without cost or obligation*. Write for your copy today!

*In Western Hemisphere Countries.

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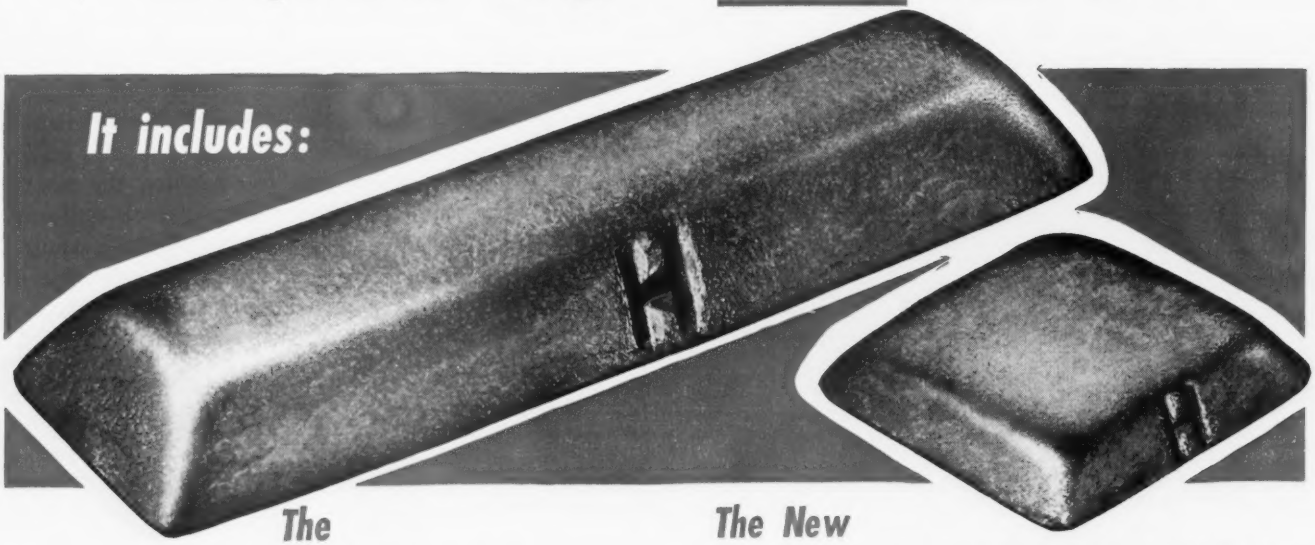

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HANNA 38-POUND PIG

The foundryman's favorite standard pig. Available in all grades, silvery and HannaTite. A good example of the quality that has made Hanna "the best known name in iron."

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EXCLUSIVE HANNATEN INGOT

For 10-lb.-pig users, this new ingot means no free-carbon pockets, finer grain structure, more even melting. Available in all grades, silvery and HannaTite—an extra-close-grain iron.

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Merchant Pig Iron Division of

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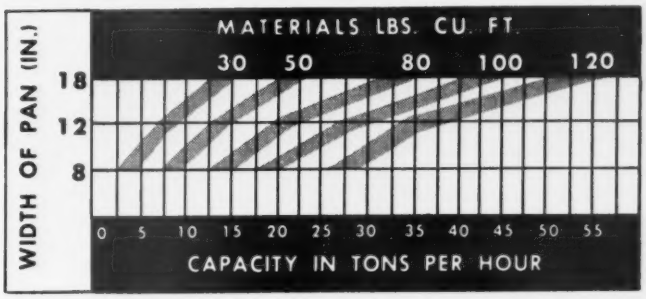
Here's the new cost-cutting answer to conveying problems!

Immediate Delivery on Hewitt-Robins Springmount Vibrating Conveyor Systems to Handle Almost Any Material . . . For Unlimited Distances . . . With Minimum Power Requirements!

The new, low-cost Hewitt-Robins Springmount Vibrating Conveyor is the answer to your materials handling problems. Designed for efficiency in action, the balanced-vibration principle of this new conveyor unit results in low dynamic loads . . . units up to 100 feet run on just a one horsepower drive! Compared to other conveying mediums the new Hewitt-Robins Springmount Vibrating Conveyor provides not only low initial cost, but later savings in operation and maintenance!

These conveyors are job-proven to be rugged! Gentle, even hopping action up to 50' per minute, the standard 4" troughed pan will carry materials; sub-freezing to 500° F.—lump or fines—wet or dry—loose or packaged—dense or porous—malleable or brittle! Special pans are available for temperatures up to 1200° F. and for severely abrasive or corrosive materials.

Hewitt-Robins Springmount Conveyors are adaptable . . . standard pan widths of 8", 12" and 18" are available in lengths from 10' and up, in standard easy-to-assemble prefabricated units . . . dividers, gates and intermediate discharge points allow flexible combinations on any conveyor operation . . . assured power-economy, in that one horsepower drives 100' of 8" pan, 80' of 12" pan or 60' of 18" pan!



Get more detailed information on the versatile Springmount Vibrating Conveyor! Contact your nearest Hewitt-Robins agent or distributor . . . or write today to Dept. VC-1, Hewitt-Robins Inc., Stamford, Conn.

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Conveyor Belting—Conveyor Machinery—Industrial Hose—Vibrating Screens—Vibrating Conveyors—Design, Manufacture, Engineering and Erection of Complete Bulk Materials Handling Systems.

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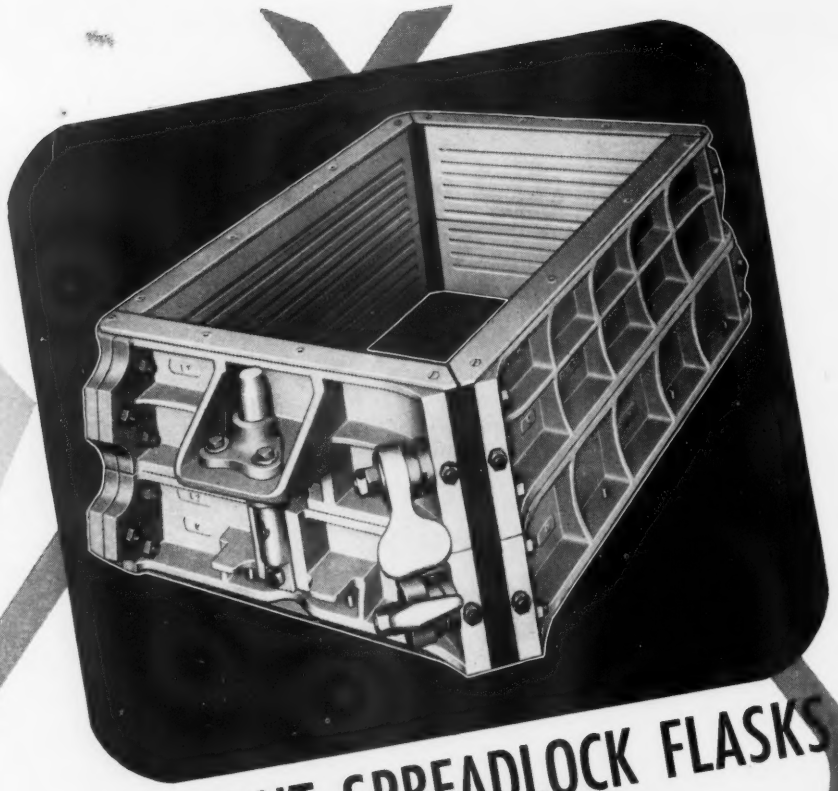
SAND-FREE CORNERS

Corner gaps completely closed by long-life, replaceable live rubber inserts.



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MODERNIZATION
Pays Off at Athens

FOUNDROMATIC *Dielectric* **SAND CORE OVEN**

Makers of Vesta Gas Range Improve Core Quality, Increase Production

Faced with ever-increasing operating costs and stiff competition, the Athens Stove Works of Athens, Tennessee, looked to modernization for the answer. One of the most significant steps taken was the replacement of coke-fired, hand-fed core ovens with a modern *Foundromatic* dielectric sand core oven.

As a result, production has been greatly increased and core quality improved. Operating fully loaded, the belt of the *Foundromatic* oven travels at a highly productive rate of 32 inches per minute. And because cores produced are free of defects, casting finishes are smoother and cleaning time is reduced.

The *Foundromatic* oven has also helped Athens meet a specific operating condition. Cores set up in molds early in the morning are not poured off until the middle of the afternoon. Because the *Foundromatic* oven produces a thorough bake, moisture pick-up is minimized.

The *Foundromatic* Sand Core Oven Can Pay Off for You With:

- Shorter Curing Time
- Less Core Handling
- Smoother Casting Finishes
- Easier Shakeout
- Better Foundry "Housekeeping"
- Lower Fuel Costs
- Fewer Rejects
- Improved Work Flow
- Reduced Cleaning Time

For all the facts on the Foundromatic *dielectric core oven, call your nearby Allis-Chalmers district office or write Allis-Chalmers, Milwaukee 1, Wis. Ask for Bulletin 15B7306B.*

Foundromatic is an Allis-Chalmers trademark.

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the whole
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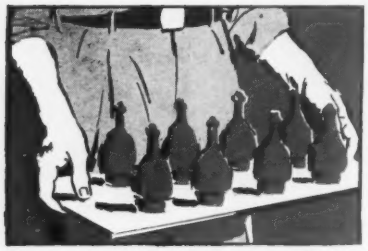
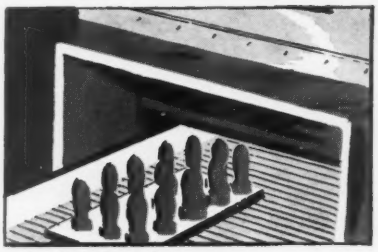


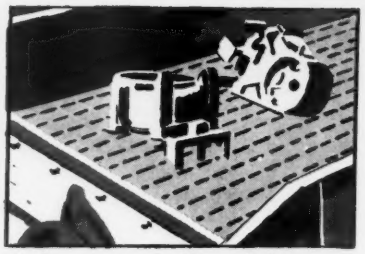
Superior Green Strength

Mogul imparts sag resistance and dimensional stability throughout handling and storage.



Quick Drying

All of our cereal binders and dextrines have this property, enabling you to increase oven capacity.



Adequate Collapsibility

These binders burn out at the desired moment, producing uniformly smooth draws.

A cereal binder for every bonding need

A complete line of foundry binders from the world's prime producer of corn products

THESE CEREAL BINDERS ARE PREFERRED FOR THEIR

- **CONSTANT AVAILABILITY**
- **SUPERIOR UNIFORMITY**
- **BROAD ADAPTABILITY**

Why you get greater green strength with MOGUL® Cereal Binder

Specially developed to meet today's needs for greater efficiency, Mogul Corn Cereal Binder is unique in the industry. Carefully controlled modern wet-milling processes produce a uniform product. Because of its bonding power in the wet state, Mogul Binder produces a core of great sag resistance and dimensional stability. Cores made with Mogul Binder produce castings with finer finish and exceedingly true pattern reproduction.

Why you get greater dry bond with KORDEK®

Kordek Core Binder renders complete binder coverage for foundry purposes. Kordek Core Binder develops a superior dry bond. Kordek is highly soluble, does not absorb core oil, and burns out completely, producing smooth draws. Kordek, a uniform product, is readily available in quantities to suit your needs.

Ask our technical service people how these superior cereal binders can help solve your casting problems. A special new foundry laboratory is ready to serve you. There is no charge or obligation for this service.

Why GLOBE® Dextrines regulate core hardness

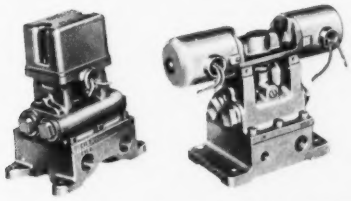
The variety of solubilities available in Globe Dextrines enables you to achieve the degree of surface hardness you require. The controlled migrating properties of Globe Dextrines assures you of a smooth, hard surface when you want it and complete burn-out at the proper moment. Globe Brand Dextrines enable you to achieve exactly the collapse rate you desire, thus assuring you clean castings with close tolerances and a minimum of scrap.

GLOBE

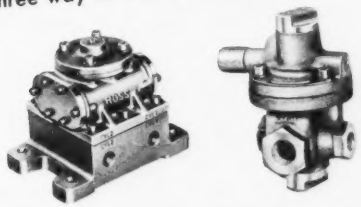
CORN PRODUCTS REFINING COMPANY • 17 BATTERY PLACE, NEW YORK 4, N. Y.

Complete Line of Ross Air Valves for Simpler Maintenance . . . Less Cost

You Should Demand One Make of Valves For Your Foundry Equipment

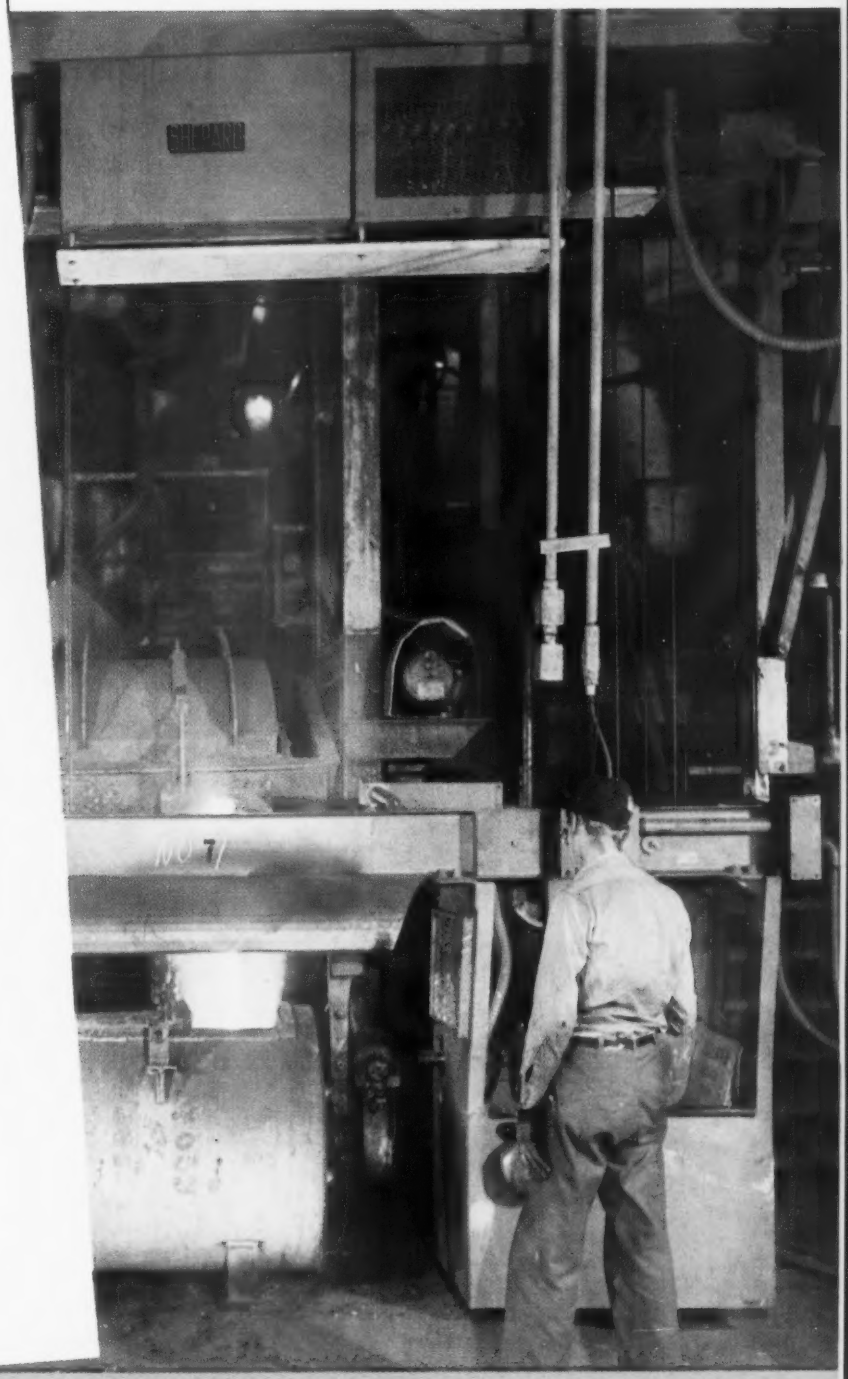


Dustproof single or momentary solenoid valves. Three way or four way. Base mounted.



Retrold (pressure operated) master valve and sequence type valve. Three way or four way. Base or line mounted.

For maximum efficiency and minimum service expense, insist that your machines are completely Ross equipped. • Ross valves are available in thousands of standard types in 1/8" to 2" pipe sizes. • Prompt, expert engineering service around the world. • Ask your nearby Ross representative to acquaint you with the complete Ross valve line for foundries.



ROSS Control VALVES

Ross OPERATING VALVE COMPANY

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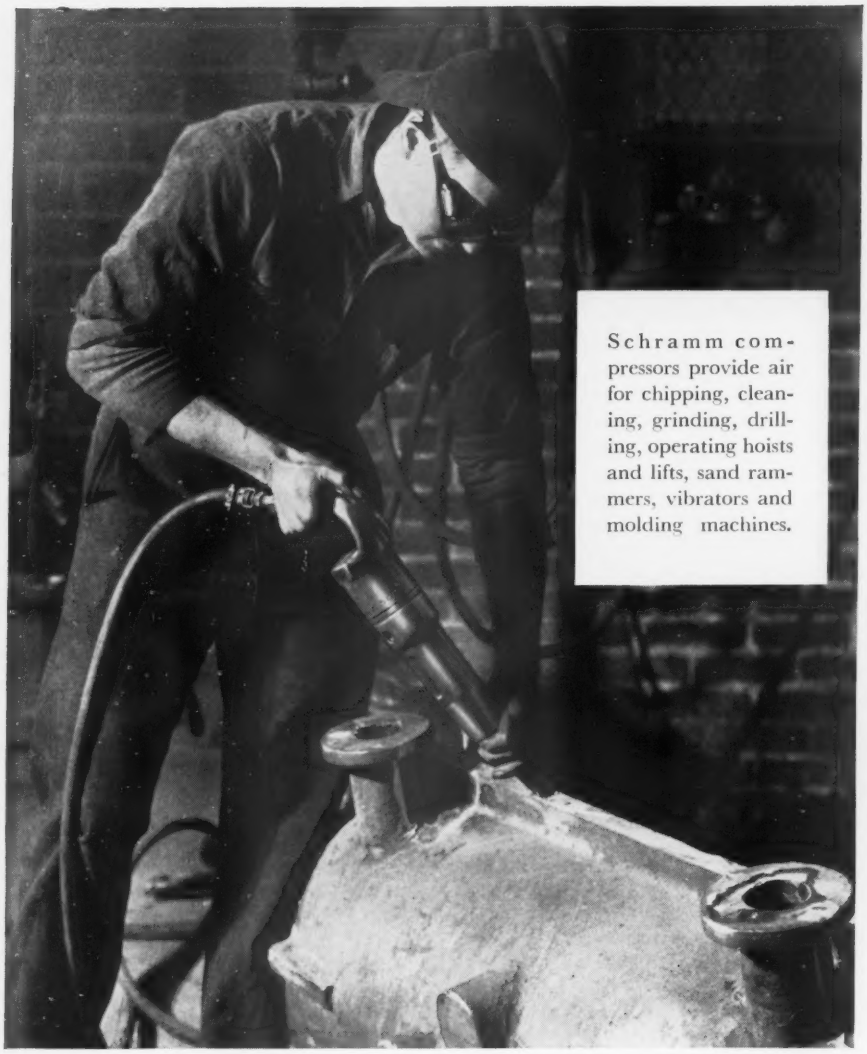
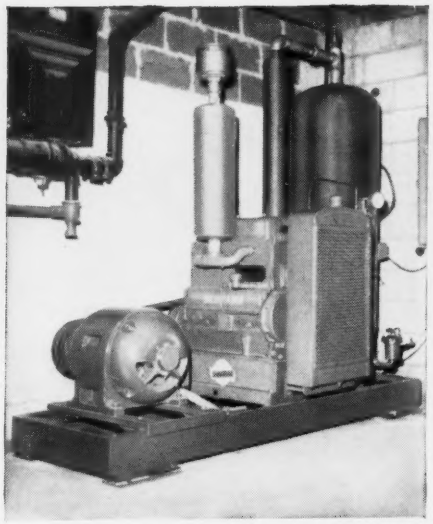
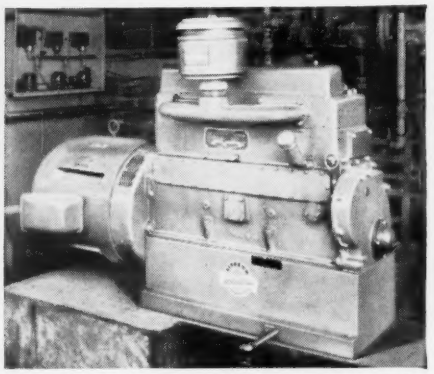


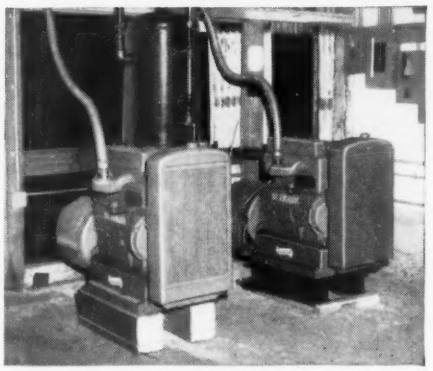
Schramm compressors provide air for chipping, cleaning, grinding, drilling, operating hoists and lifts, sand rammers, vibrators and molding machines.



ADEQUATE POWER WITH PROPER CONTROL. Schramm compressors may be driven by any source of rotative power. Motors can be supplied as original equipment. Illustrated is V-belt drive.



JACKETED LIQUID COOLING SYSTEM. Units delivering 85 c.f.m. and over are jacketed for liquid cooling. Furnished with inlet and outlet flanges or Schramm cooling unit.



NO FOUNDATIONS. Schramm balanced design permits installation without expensive foundations. Units can be set up in almost any out-of-the-way location.

ONE AIR COMPRESSOR USER REPORTS:

"Eight years of satisfactory service and not a cent for repairs"

In modern foundry and steel mill practice, where compressed air is indispensable, Schramm Industrial Compressors are establishing new records for continuous, trouble-free performance.

Schramm Compressors set performance records because they incorporate many design features found in no other machine. Balanced reciprocating parts give vibrationless operation, permit out-of-the-way installation without special foundations. Schramm engineered cooling systems—air blast for units delivering 50 c.f.m. of free air, or less; liquid cooling for larger sizes—provide adequate cooling for full load, permitting continuous operation. All Schramm units have mechanical intake valves, long-life discharge valves, gear type pump lubrication and multi-cylinder construction with 90% interchangeable parts between sizes. Any source of rotative power can be used to drive a Schramm Compressor.

The economic advantages of buying Schramm Industrial Compressors are outstanding. Initial cost, compared with other compressors delivering the same amount of free air, is low. Maintenance of Schramm compressors is no problem—any mechanic who understands gasoline engines understands Schramm compressors. And Schramm forced lubrication reduces wear on all moving parts. A Schramm Model 315 Unistage Compressor, after operating 5,500 hours, showed only .0005" wear on the main bearings.

Schramm manufactures a complete line of Air Compressors and accessories for all industrial uses. Write today for free literature. Catalog GC-55 describes our Small Industrial Air Compressors, Catalog 5510, Industrial Air Compressors. You will also want a copy of our informative booklet, "Piston vs Rotary Air Compressors." There are no obligations.

Your local Schramm Dealer is listed in the Yellow Pages of your telephone directory.

Schramm, Inc.

MANUFACTURERS OF AIR COMPRESSORS

650 North Garfield Avenue

West Chester, Pa.

Selling Gray Iron to your customers...every month

Materials Methods
STEEL
the IronAge
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Fabricated = 35 Parts
Cast in Gray Iron = 13 Parts
This symbol assures you the most for your casting dollar
GRAY IRON FOUNDERS' SOCIETY

Gray Iron Founders' Society advertising, placed in leading national trade magazines, stresses the integrity and good management of Society member foundries. This advertising recommends members *first* to interested prospects. These potential buyers ask for and receive complete information about the advantages of using Gray Iron for existing or new products.

These same prospects also receive advertisement reprints and other direct-mail promotional material prepared by the Society for use by member foundries. The combined selling impact of the national advertising and the local mailings results in *improved recognition* of Gray Iron values and in *increased sales potentials* for Society members.

Join forces with progressive member foundries and obtain these and many other benefits made possible through joint effort. To learn what association in the Society can do for you, send the coupon today.

GRAY IRON FOUNDERS' SOCIETY, INC.
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GRAY IRON FOUNDERS' SOCIETY

At Elkhart:

53.2% increase in casting production!

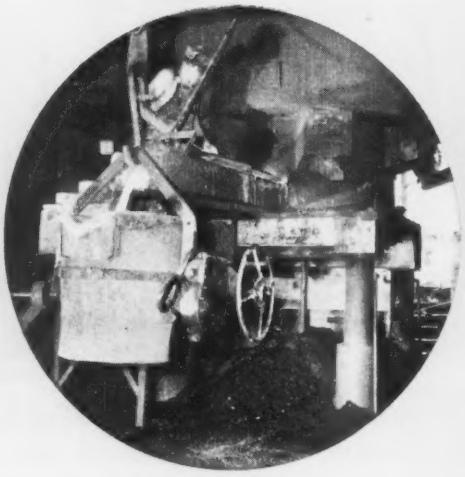
TRAMBEAM CHARGING SYSTEM AND NEW WHITING CUPOLA STEP-UP CAPACITY WITHOUT INCREASING MANPOWER

Mechanization is paying big dividends for Elkhart Foundry and Machine Company, Elkhart, Indiana! A Whiting Trambeam Charging System, with double-leaf, drop-bottom buckets; a new Whiting Cupola; and a set of Whiting Ladles all contribute to faster, more efficient operation. The results? Before the installation of this new equipment, the charging rate was 746 pounds of metal per manhour—today it is 1143 pounds per manhour — *a 53.2% increase!* This profitable improvement makes graphic the benefits of bringing your foundry equipment up to date . . . taking advantage of cost-cutting that Whiting equipment makes possible. Talk over your own problems with a Whiting engineer—he can help you make *new* savings and profits!

WHITING CORPORATION
15607 Lathrop Avenue, Harvey, Illinois

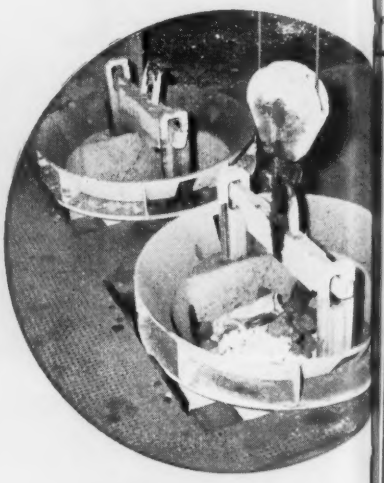
the old way . . .

Firing the "old left-hander" cupola which Elkhart formerly used . . . a hit-or-miss hand operation, success dependent on luck and the personal skill of workmen.



new . . .

This new No. 6 Whiting Cupola with its greater capacity and more efficient operation makes melting at Elkhart Foundry and Machine Company a money-saving science.



new . . .

These two Whiting double-leaf, drop-bottom buckets used with the new Trambeam Charging System assure correctly proportioned charges and even distribution in the cupola.

Write today!

Get complete information on Whiting Cupolas, Buckets and Trambeam Systems!

WHITING FOUNDRY PRODUCTS INCLUDE:

Cupolas • Cupola Spark Suppressors • Cupola Hot Blast Equipment • Cupola Blast Moisture Control Equipment • Cupola Charging Systems • Cradle Furnaces • Hot Metal Mixers • Duplex Melting Systems • Air Furnaces • Electric Melting Furnaces • Ladles • Ladle Handlers • Ladle Preheaters • Tumbling Mills • Annealing Ovens • Transfer Cars • Pulverizers • Pulverized Coal Firing Systems • Turntables • Cranes • Trackmobile • Trambeam Overhead Handling Systems

WHITING

Engineered

FOUNDRY EQUIPMENT

the old way . . .

The slow, inefficient method of charging shown at left was once used by Elkhart to raise loads of coke, stone and scrap to the charging floor . . . now replaced by the fast, flexible Trambeam Charging System shown below.

new . . .

Elkhart's new Trambeam Charging Crane lifts loaded Whiting double-leaf, drop-bottom buckets into the Whiting Cupola at precision-controlled speed. This system is the greatest single contributing factor to their 53.2% saving.

For the Finest in Hand Protection...

NEW AO "DREDNAUT" line of COWHIDE GLOVES

They're SPECIALLY TANNED

- **You get the Flexibility of Horsehide**
- **You get the Tensile Strength of Horsehide**
- **You get the Heat Resistance of Horsehide**
- **And . . . you get the Abrasive Resistance (Longer Wear) of Cowhide**

The "Drednaut" line consists of 6 heavy duty, specially chrome-tanned side-split cowhide gloves styled and tailored with typical AO know-how of what welders want and need. What's more, these gloves are priced to move!

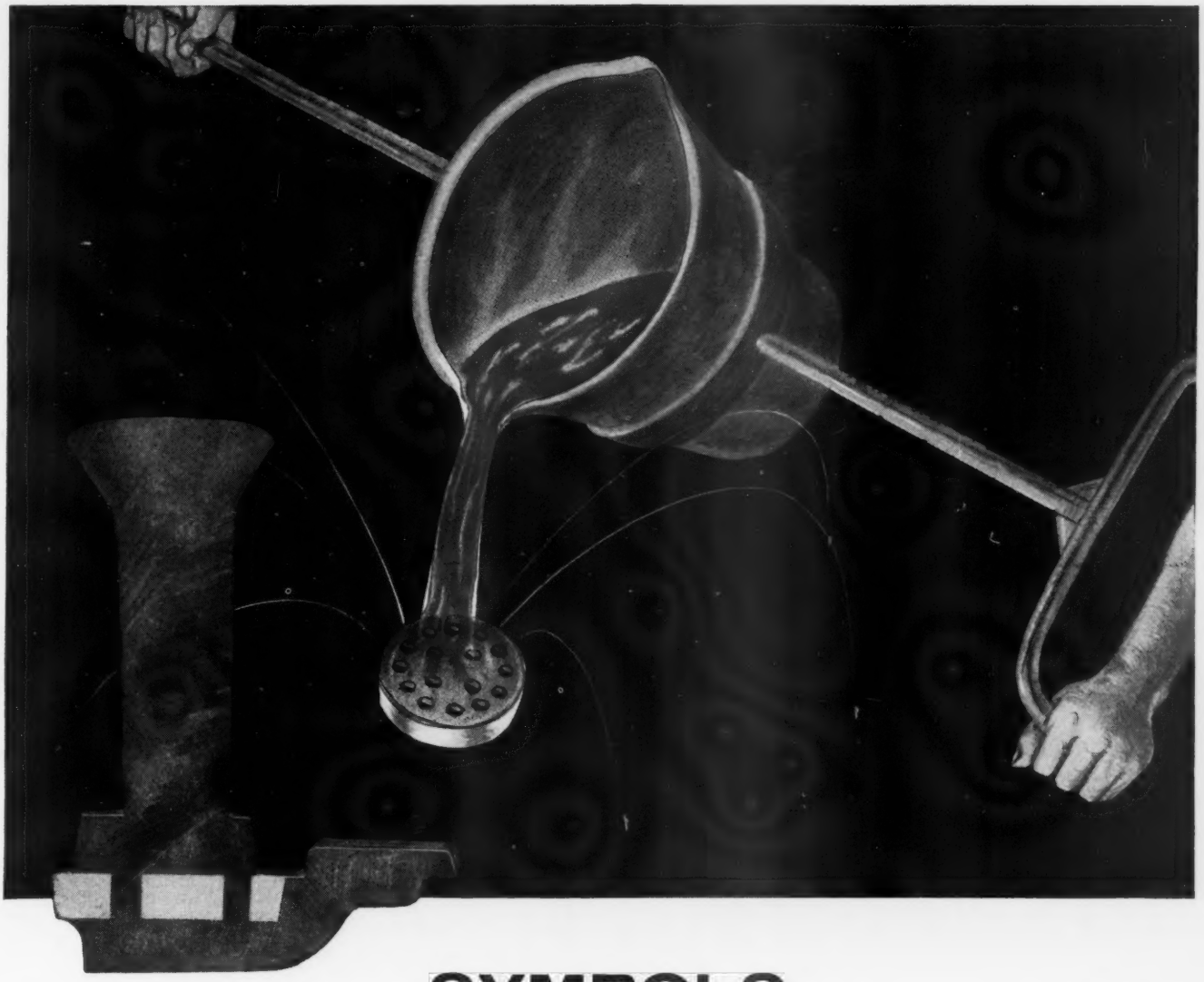
For hot weather, hot job comfort . . . keep production up with AO Sweatbands.

†T. M. REG. BY AMERICAN OPTICAL COMPANY

LOOK FOR THE AO "Drednaut" and the light green shade. Your nearest AO Safety Products Representative can supply you.

American Optical
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES



SYMBOLS

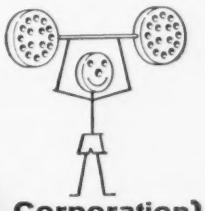
OF A MONEYSAVING REVOLUTION

Just a few short years ago, *both* parts of the illustration above would have seemed sheer fantasy. But that cross-section picture at the left is today a reality, visible evidence of *why* refractory strainer cores are being used for more and more castings.

Note the clean, sharp lines where the molten metal has passed through the strainer core. Here is *proof* that Louthan Refractory Cores give you closer control of the metal. They also keep slag and core-sand inclusions out of castings, save needless grinding and rejects, often eliminate the need of elaborate and costly gating systems.

Today, Louthan Refractory Cores are used in the making of nearly a *million* castings a month. They withstand 3,000° F. temperatures without spalling or disintegrating. They are exceptionally uniform, dimensionally accurate, easy to handle and use.

If you haven't yet tried these moneysaving *refractory* cores, we invite you to do so. Standard sizes range from 1¾″ to 3½″ in diameter, while special sizes and shapes can be made for your specific requirements. Why not give them a trial?

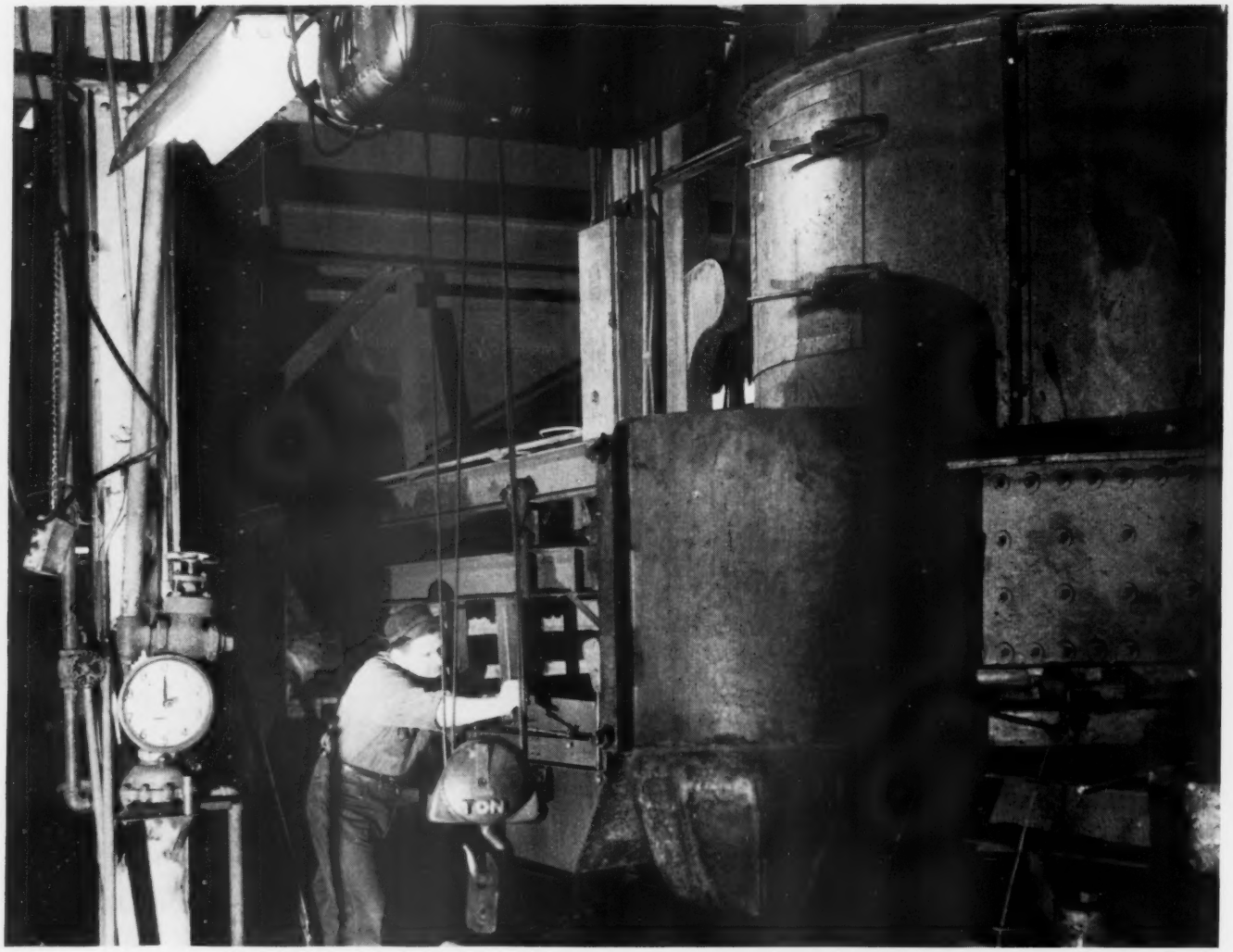


Louthan **REFRACTORY STRAINER CORES**

Louthan Mfg. Co., East Liverpool, Ohio (Subsidiary of FERRO Corporation)

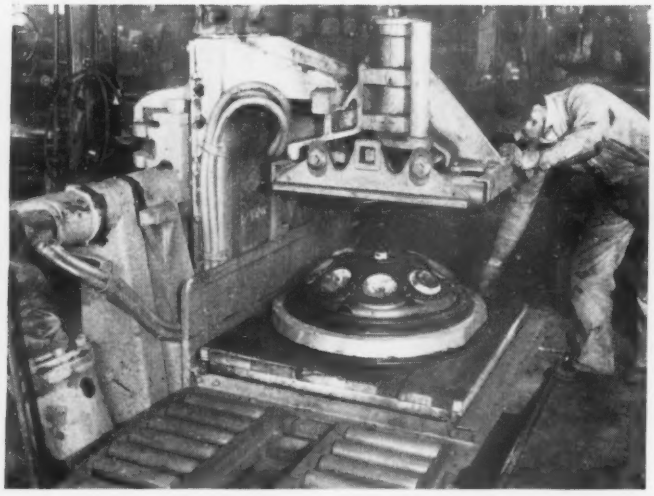
REPRESENTATIVES: FREDERIC B. STEVENS, INC., 1800 18th St., DETROIT 16, MICH.; 93 Stone St., BUFFALO, N. Y.; 36 Shelby St., INDIANAPOLIS 7, IND.; P. O. Box 1716, NEW HAVEN, CONN.; 41 Dovercourt, TORONTO 1, ONT., CAN.; 1262 McDougall St., WINDSOR, ONT., CAN. **FOUNDRY SUPPLY CO.**, 5009 Excelsior Blvd., MINNEAPOLIS 16, MINN.

(Advertisement)

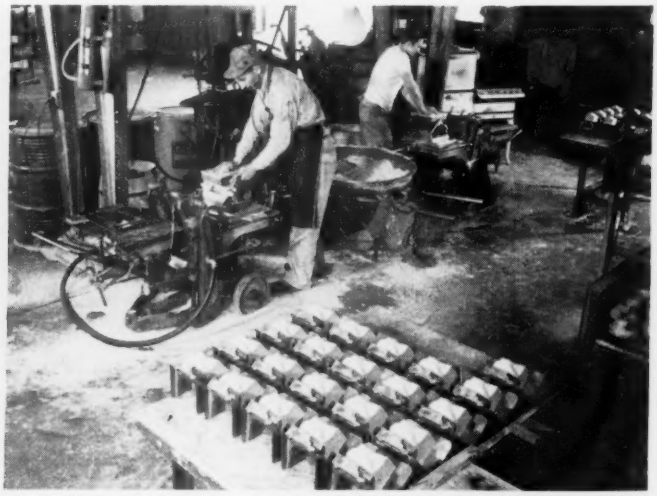


These Foundries Report Profits!

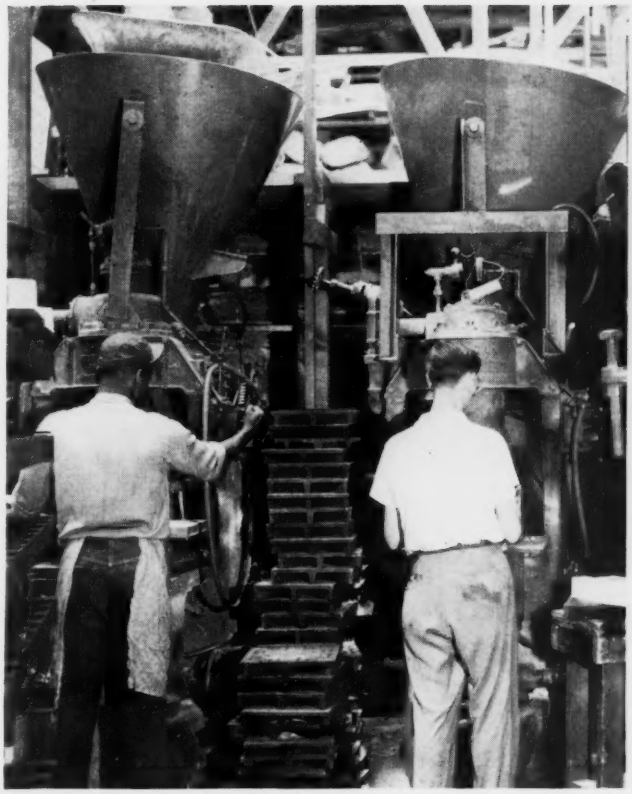
SPEEDMULLORS ON BOTH MOLDING LINES at the I. F. Sales Company foundry at New Philadelphia, Ohio, thoroughly mull all of the all-purpose sand required for 250,000 malleable castings per month. The sand is reused many times a day and enters the "70" Speedmullor (shown above) and the "50" on the other line, very hot. Speedmullor Cooling cools the sand *during* mulling. *For full information write Beardsley & Piper, 2424 N. Cicero Avenue, Chicago 39, Illinois.*



SPECIALLY DESIGNED FOR SLINGER INSTALLATIONS, this J & J Rol-A-Draw rolls over and precisely draws the molds rammed on a slinger-roller conveyor molding unit at Casting Service Corporation, LaPorte, Indiana. The Rol-A-Draw greatly simplifies the job of mold and pattern handling. *For full data write to Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Illinois.*



ON THIS DIFFICULT COREMAKING JOB, CHAMPION JOLT ROLLOVERS are doing a fast precision job. The very deep-finned insert cores for aluminum cylinder heads are produced in large quantities. To fill and draw the deep thin fin sections requires perfect Champion jolting action and a precision Champion draw. *Obtain full data by writing Beardsley & Piper, 2424 N. Cicero Avenue, Chicago 39, Illinois.*

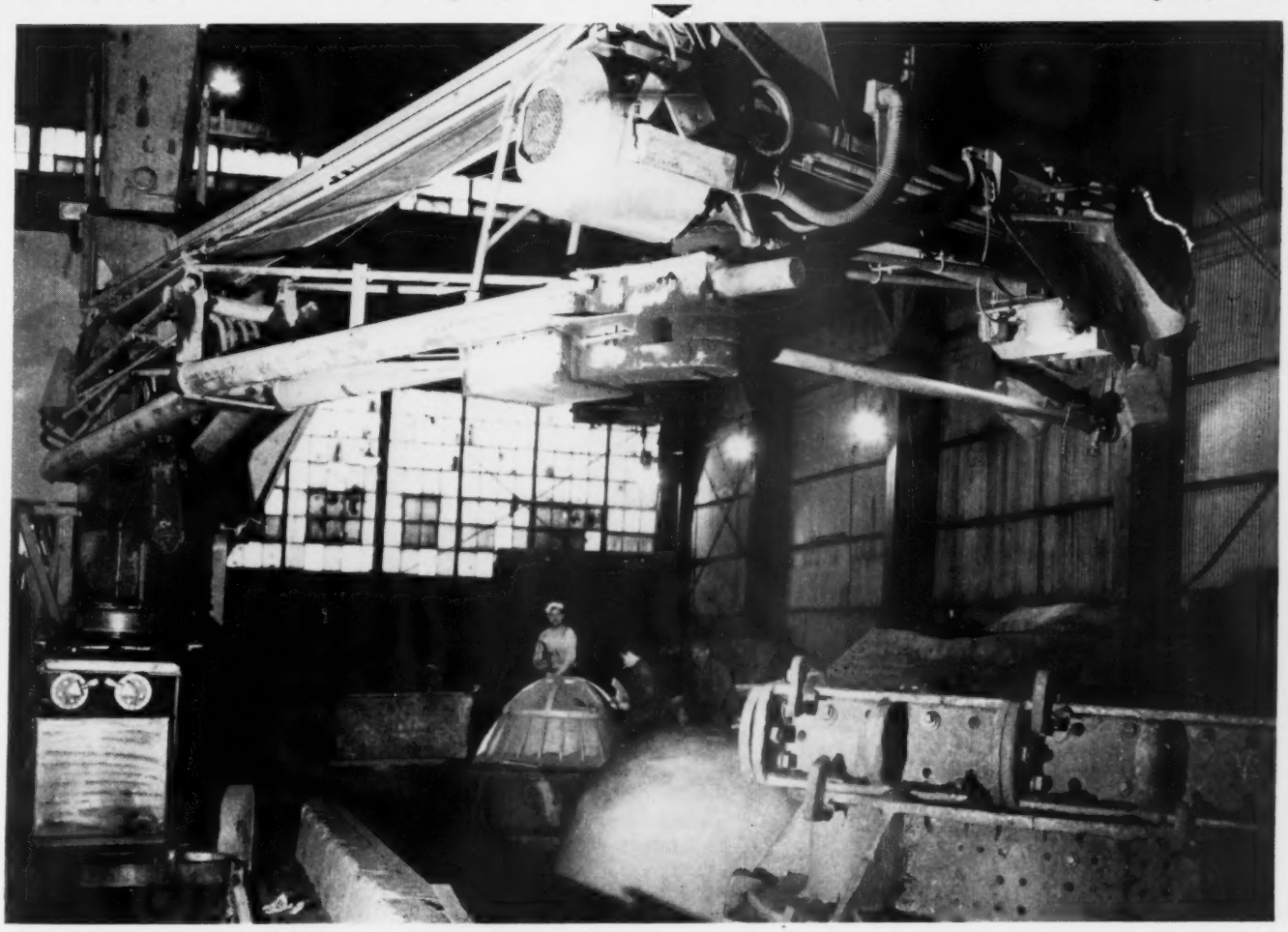


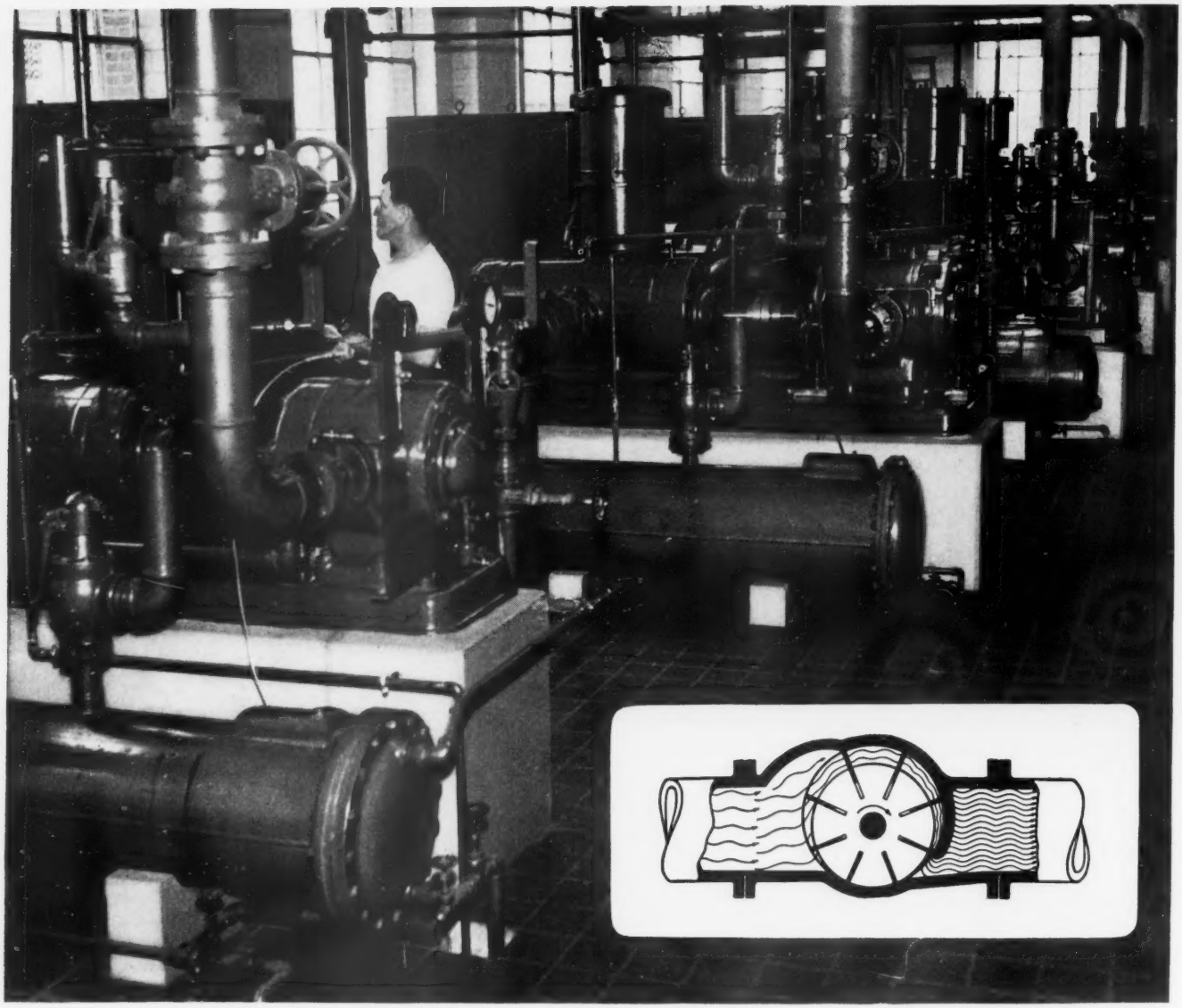
CHAMPION FLEXIBLOS IN THIS MAGNESIUM FOUNDRY mean real savings on small and medium size cores. In producing precision magnesium aircraft castings, the Howard Foundry in Chicago depends on Champion Flexiblo Core Blowers and Speedmullors. *For more data on this interesting operation write now to Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Illinois.*

SCREENARATORS AND J&J JOLT SQUEEZERS handle much of the side floor molding at Harsch Bronze in Cleveland. *For more information write to Beardsley & Piper, 2424 N. Cicero Avenue, Chicago 39, Illinois.*

A JR. NITE GANG CUTS COSTS in side floor molding sand preparation at the Kasper Foundry, Elyria, Ohio. *For full information write to Beardsley & Piper, 2424 N. Cicero Avenue, Chicago 39, Illinois.*

PITTSBURGH STEEL'S FOUR SPEEDSLINGERS AND A SANDSLINGER ram a major portion of that foundry's molds. Jobbing work ranging from several pounds to well over 200,000 pounds is produced. Slingers are indispensible in this operation. *For the full story write today to Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Illinois.*





Industrial Pressures Up To 125 psig
Capacities to 3300 cfm

When you need such performance, it will pay you to specify Fuller vane-type Rotary Compressors. They provide the simplest, most economical and most reliable source of compressed air for all pneumatic plant services.

These compressors have a minimum number of moving parts, (rotor, blades and bearings) employ direct-connected motor drive, and operate with an incredible lack of vibration. They run for days without requiring operational attention, and are ideal for continuous service in out-of-the-way locations.

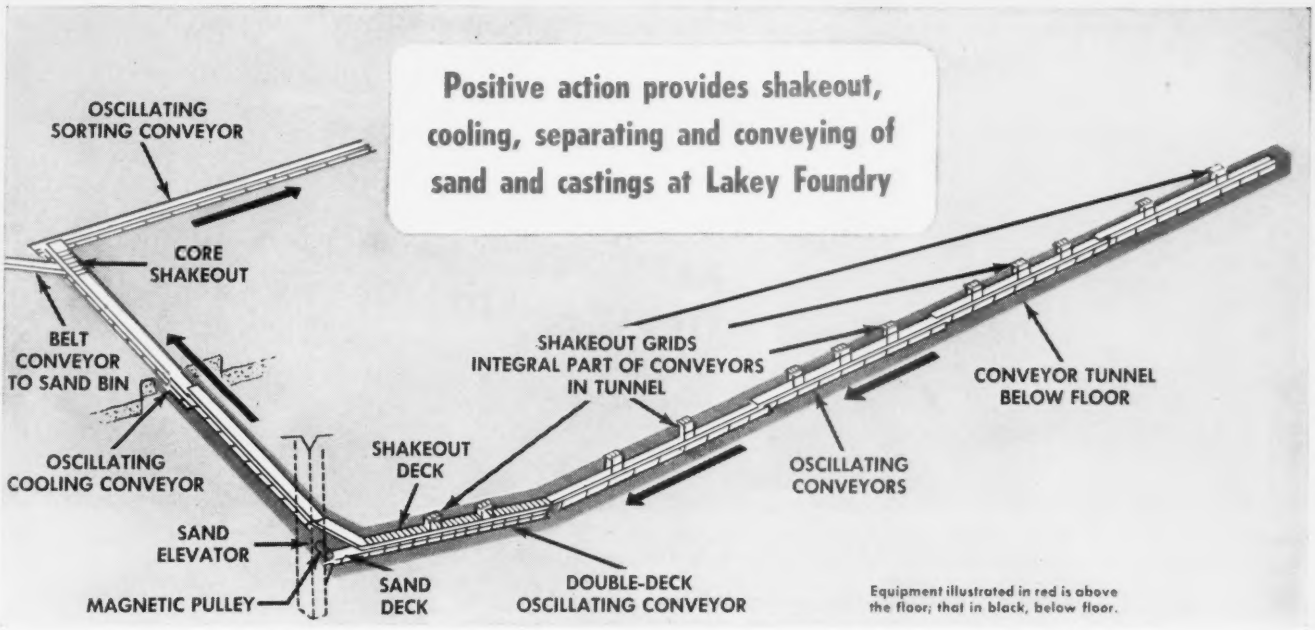
Detailed information on design characteristics, and typical applications will be forwarded promptly on request.

Fuller
. . . . pioneers in harnessing AIR

FULLER COMPANY, Catasauqua, Pa.
GENERAL AMERICAN TRANSPORTATION CORPORATION SUBSIDIARY
Chicago • San Francisco • Los Angeles • Seattle • Birmingham

C-269
1554

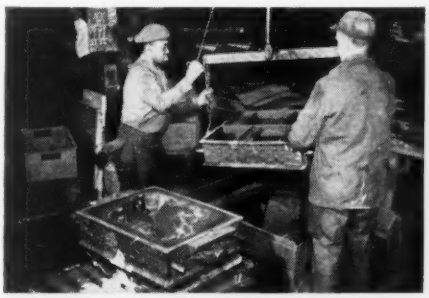
Gets MULTIPLE-DUTY with LINK-BELT Oscillating Conveyors


Positive action provides shakeout, cooling, separating and conveying of sand and castings at Lakey Foundry
OSCILLATING SORTING CONVEYOR
CORE SHAKEOUT
BELT CONVEYOR TO SAND BIN
OSCILLATING COOLING CONVEYOR
SAND ELEVATOR
MAGNETIC PULLEY
SHAKEOUT DECK
SAND DECK
SHAKEOUT GRIDS INTEGRAL PART OF CONVEYORS IN TUNNEL
DOUBLE-DECK OSCILLATING CONVEYOR
OSCILLATING CONVEYORS
CONVEYOR TUNNEL BELOW FLOOR
Equipment illustrated in red is above the floor; that in black, below floor.

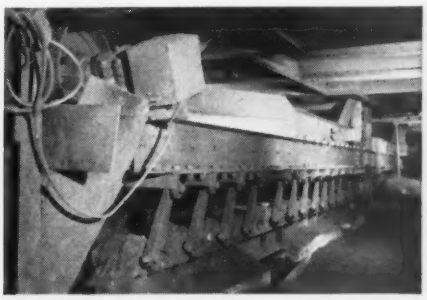
HERE'S proof that the positive action of Link-Belt Oscillating Conveyors is not affected by surges. The installation at Lakey Foundry, Muskegon, Mich., has 430 ft. of oscillating conveyors performing multiple duties in handling 185 tph of sand and castings.

Five 48-in. wide oscillating conveyors in this system are located under the floor. All have shakeout grids integral with the trough and extending above the floor. Grid units function as tight-flask shakeouts, and sand and castings drop to conveyor trough. The fifth conveyor is double-decked. Sand conveyed on the lower deck passes under a magnetic pulley to remove metal, then is discharged into a bucket elevator. Castings on the upper deck are discharged to inclined oscillating conveyors for cooling and delivery to core shakeout. A flat-top oscillating conveyor above the floor is used for picking and sorting.

Link-Belt equipment and engineering experience — which have produced installations handling up to 450 tph — can bring similar high productivity to your own foundry. For facts on Link-Belt Oscillating Conveyors, call your nearby Link-Belt office or write for Book 2444. These conveyors in standard 36-in. wide sections are available from local stocks.



At shakeout stations, oscillating motion of conveyors breaks sand from flask when flask is set on grids extending up through floor. Sand and castings fall into oscillators.



Link-Belt double-deck oscillator is fed by four other conveyors in tunnel. Top deck carries castings; lower conveys sand under magnetic pulley to bucket elevator.

Worker sorts castings from 54-in. flat-top sorting oscillating conveyor, after the Link-Belt shakeout has knocked out the cores. Capacity is 35 tph.

LINK-BELT

CONVEYORS AND PREPARATION MACHINERY

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13,681

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

FACT:
Without good bentonite your sand molds will produce costly REJECTS.
FACT:
NATIONAL BENTONITE is the Finest Quality Obtainable,
mined from the world's purest sources of bentonite . . .
processed by the world's largest producers of bentonite.

It's a proved fact that the quality of bentonite you use in molding can determine the amount of money you lose by rejects. Try and save a few cents by using poorer quality bentonite and you may lose hundreds of dollars. Good bentonite is good insurance for your profits . . . and good bentonite means National Bentonite. Here's why:

National Bentonite is selected from only the finest types of bentonite in the world. It is processed with laboratory exactness so it is always the same, uniform high quality. It provides excellent mold durability, yields higher permeability, has good green strength, higher tensile strength, higher hot strength, and higher sintering point. Besides that, National Bentonite requires less water to bond, so reduces the amount of vapor to be vented. All points considered, National Bentonite offers you greater quality and better characteristics to make good sand molds. This is why scores of good foundrymen have specified National Bentonite for years.

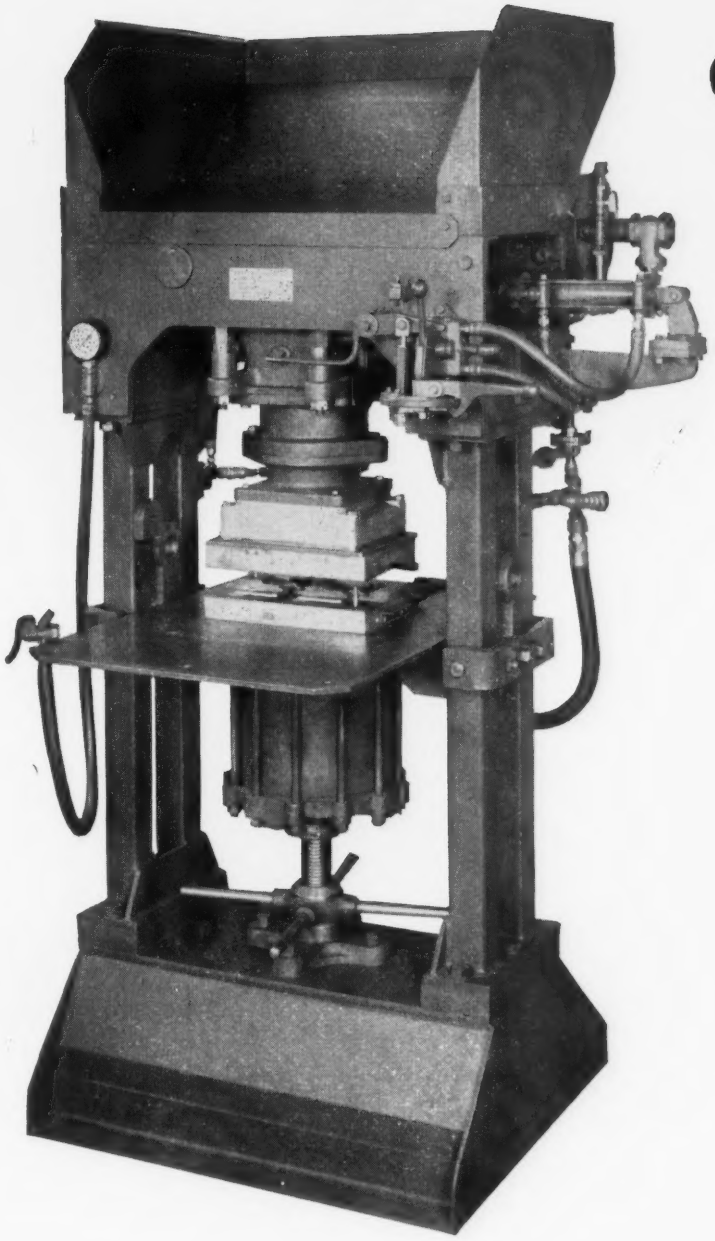
Available from better foundry suppliers everywhere. Write or phone today for specifications and prices.

Baroid

Baroid Division ☆ National Lead Company

Bentonite Sales Office: Railway Exchange Building, Chicago 4, Illinois

Redford No. 4-D DRAW TYPE CORE BLOWER



Designed primarily to fill the need for a fast and flexible draw type machine to handle work from a few ounces to 10 lbs., the Redford #4-D can be quickly adjusted to accommodate core boxes not requiring the draw feature, or can be equipped with a clamp to handle vertically parted core boxes.

Rugged construction, simplicity of change-overs and a fast operating cycle make it suitable for either jobbing or high production work.

Exhaust air is utilized to thoroughly fluff the sand remaining in the sand magazine after each blow, thus reducing the possibility of cratering.

The stationary sand magazine and accurately guided draw table assure perfect drawing of the cores. Vibration of the core box is automatic.

Magazine heads normally furnished with the #2 Redford machine can be used with the #4-D Redford. Larger new type magazine heads especially suited for draw type work are also available as standard equipment.

Valves are designed to assure maximum safety. The operator must use both hands at the same time in order to clamp the core box.

The Redford #4-D has been thoroughly proven in both small and large foundries. To get complete information write for Bulletin 4-D.

Redford IRON & EQUIPMENT CO.

20733 GLENDALE AVENUE • Phone KEnwood 1-8611 • DETROIT 23, MICHIGAN

Remove metal **FASTER...**

YOUR CARBORUNDUM DISTRIBUTOR or salesman offers expert help in selecting the wheels best suited to your operations. He's completely stocked to give you fast, efficient service. Call him today—listed in the yellow pages of your phone book under "Abrasives" or "Grinding Wheels."

FREE BOOKLET! "Abrasive Products for the Foundry" gives recommended wheel gradings for various materials, plus detailed information on the complete line of cost-cutting abrasive products by CARBORUNDUM for foundry use. Write The Carborundum Company, Dept. F 81-510, Niagara Falls, New York. In Canada: Canadian Carborundum Company, Ltd., Niagara Falls, Ontario.

on every **SNAGGING** *operation*

CARBORUNDUM'S B5 RESINOID BOND SNAGGING WHEELS, in both aluminum oxide and silicon carbide, combine uniformly *higher* rate of cut with *longer* life...which means substantial savings in any foundry.

Operators find that snagging wheels by CARBORUNDUM resist loading and are easier to use, with far less physical effort. In addition, the new type bonds incorporate exceptional strength. Wheels hold shape longer, resist mechanical shock as well as heat shock, and give maximum safety under the most severe grinding operations.

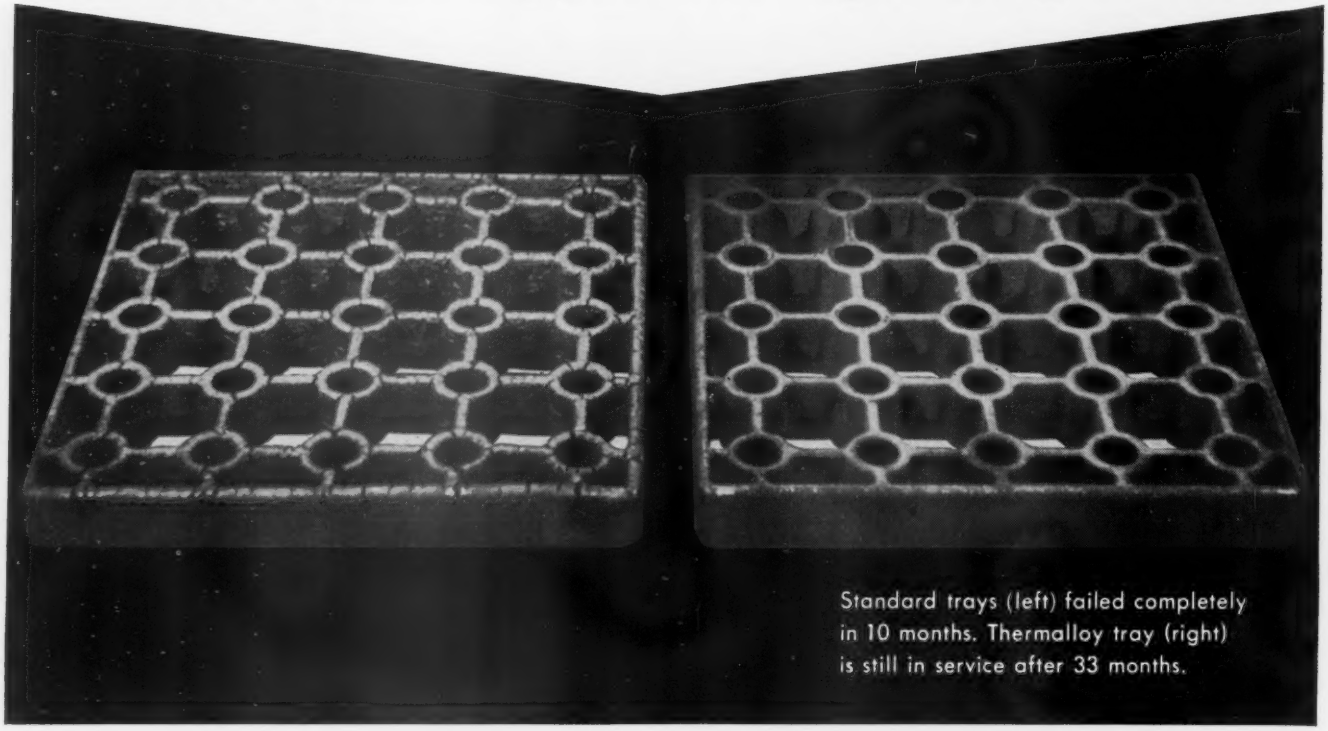
FOR EVERY ABRASIVE JOB in your foundry...on castings, forgings, welds...on high and low tensile steels...on non-ferrous metals...and on every type of machine...the proper snagging wheels by CARBORUNDUM can increase your production and cut your costs.

CARBORUNDUM
REGISTERED TRADE MARK

...continually putting more **SENSE** *in your abrasive* **DOLLAR**

81-510

THERMALLOY* Application Engineering at Work



Standard trays (left) failed completely in 10 months. Thermalloy tray (right) is still in service after 33 months.

A SPLIT RUN PROVED OUR POINT!

Electro-Alloys offers engineering advantages unique in the high alloy field . . . because an experienced staff of engineers and metallurgists is available to help you design longer lasting heat-treat parts in Thermalloy.

Here's how our staff helped a large automotive manufacturer realize longer service from heat-treat trays used in carburizing service followed by oil quenching. Shown above are two types of trays used. One was of standard analysis. And the other tray was cast in a special analysis of heat-resistant Thermalloy . . . recommended by our staff after a careful study of job requirements.

We suggested that a split order of both trays be placed in identical carburizing service. The split run proved our point . . . the standard tray failed completely in 10 months, and the Thermalloy tray is still in service after 33 months.

Electro-Alloys engineering and metallurgical know-how has made a substantial difference in the life of many heat-treat and furnace parts. Can we help you? Call our nearest representative or write Elyria for Thermalloy General Catalog, T-225.

Constant research improves Thermalloy. Here, in tensile testing section, a strain indicator helps measure performance of Thermalloy up to the breaking point.

*Reg. U. S. Pat. Off.

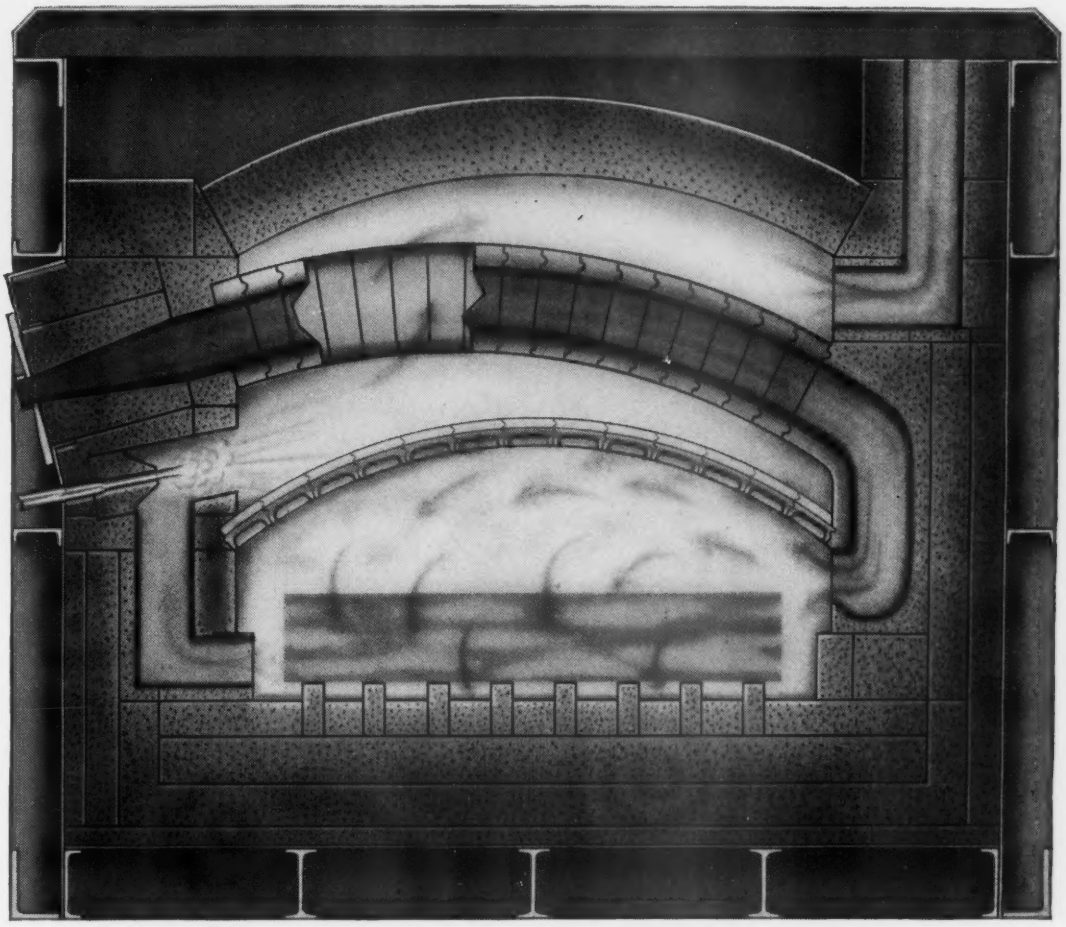
AMERICAN Brake Shoe COMPANY

ELECTRO-ALLOYS DIVISION

6005 TAYLOR ST., ELYRIA, OHIO

Sales offices in: Los Angeles, Oakland, Chicago, Detroit, New York, Cleveland, Philadelphia, Pittsburgh

Another Norton Rx *on the job!*



Cross-section of a Lithium Company two-stage hot atmosphere recuperative furnace for scale-free heating of ferrous and non-ferrous metals for precision forging and rolling. The segmented conduit, a Lithium Company design, is made of Norton CRYSTOLON tongue and groove tiles. Fired shapes of this same material form the side walls. Burner block is of ALUNDUM refractory material.

Lithium Company specifies long-life ALUNDUM and CRYSTOLON* refractory shapes for its atmosphere furnaces*

The Lithium Company of Newark, N. J., well-known builder of atmosphere furnaces, reports excellent results from Norton refractories.

The Lithium designed refractory shapes are Norton CRYSTOLON Silicon Carbide. They were selected for their hot strength, high refractoriness, thermal conductivity, and low thermal expansion. They give long, trouble-free service life at temperatures up to 2900°F. ALUNDUM refractory material was the choice for the burner block because of its high refractoriness and resistance to chemical influences at temperatures up to 3450°F.

For your own furnace operations

It will pay you to investigate how Norton Rx's — *engineered and prescribed* refractories — can help you save time, work and money. See your Norton Representative or write to NORTON COMPANY, Refractories Division, 307 New Bond Street, Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto 5, Ont.

NORTON
REFRACTORIES
Engineered... Rx... Prescribed
Making better products... to make your products better

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

MODEL 2160-C

MODEL 3070

Sweet Music

. . . to the foundryman

. . . is the sound of profitable production

The progressive foundryman . . . like the eminent musician . . . knows that skill alone is not enough. Both rely on top-quality precision "equipment" to achieve greater success in highly competitive fields.

SPO also recognizes this basic need . . . the need for precision machines. That is why SPO specializes in the development and manufacture of dependable molding machines . . . efficient machines that produce a greater volume of uniform standard molds . . . eliminate "human error" . . . cost less to operate and maintain.

SPO molding machines give you the "sweet music" of profit.

Write today . . . or call DIamond 1-3666 . . . for additional information.

WORLD'S LARGEST SUPPLIERS SPO OF MOLDING MACHINES

SPO INCORPORATED

6449 Grand Division Avenue, Cleveland 25, Ohio

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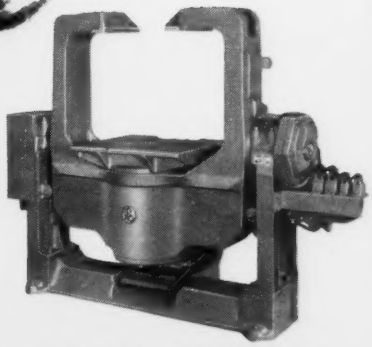
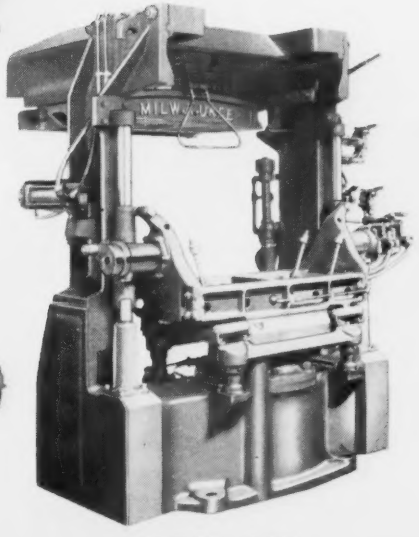
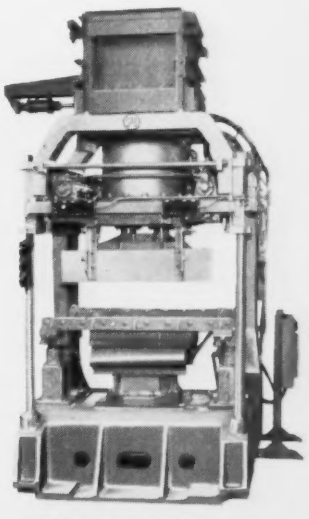


MODEL 9546



MODEL 217



MODEL 2302

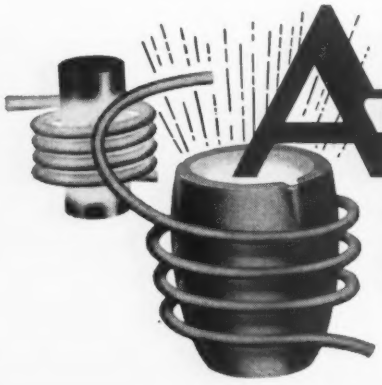
600 POUNDS OF BRONZE melted in 23 minutes

This steel and non-ferrous centrifugal-casting foundry saves more than time through the use of Ajax-Northrup induction furnaces. Freedom from contamination and almost complete metal recovery are direct results of the high speed characteristic of the Ajax-Northrup melting principle. Electrical energy, used as the source of power, is expended almost entirely in the charge. Little is wasted on the refractory lining or outside the furnace, thereby making working conditions better and more efficient at the same time.

Many Ajax-Northrup furnaces are made to accept either ferrous or non-ferrous work . . . with impressive savings for both. With non-ferrous alloys savings of over $33.00 a ton are reported in reduced metal losses alone. And for ferrous work, recovery is reported as high as 100% for nickel and 99% for chromium.

Economy recommends it, progress demands it; induction melting is fundamental to modern precision foundry work. Write for Bulletin 27-B . . . Ajax Electrothermic Corp., Trenton 5, New Jersey.

Associated Companies: Ajax Electric Company—Ajax Electric Furnace Co.—Ajax Engineering Corp.



AJAX NORTHRUP SINCE 1916

INDUCTION HEATING-MELTING

Compressor keeps foundry supplied with air— TIMKEN® bearings hold down wear

WHEN compressor parts stay in proper alignment, there's less wear—practically never a breakdown. One way Pennsylvania Pump and Compressor Company insures long-lasting accuracy of related parts is by mounting the crankshaft and belt idler attachments of this compressor on Timken® tapered roller bearings.

In the crankshaft application, for example, Timken bearings reduce wear by holding the shaft and adjacent parts in positive alignment. That's because the tapered construction of Timken bearings enables them to take any combination of radial and thrust loads.

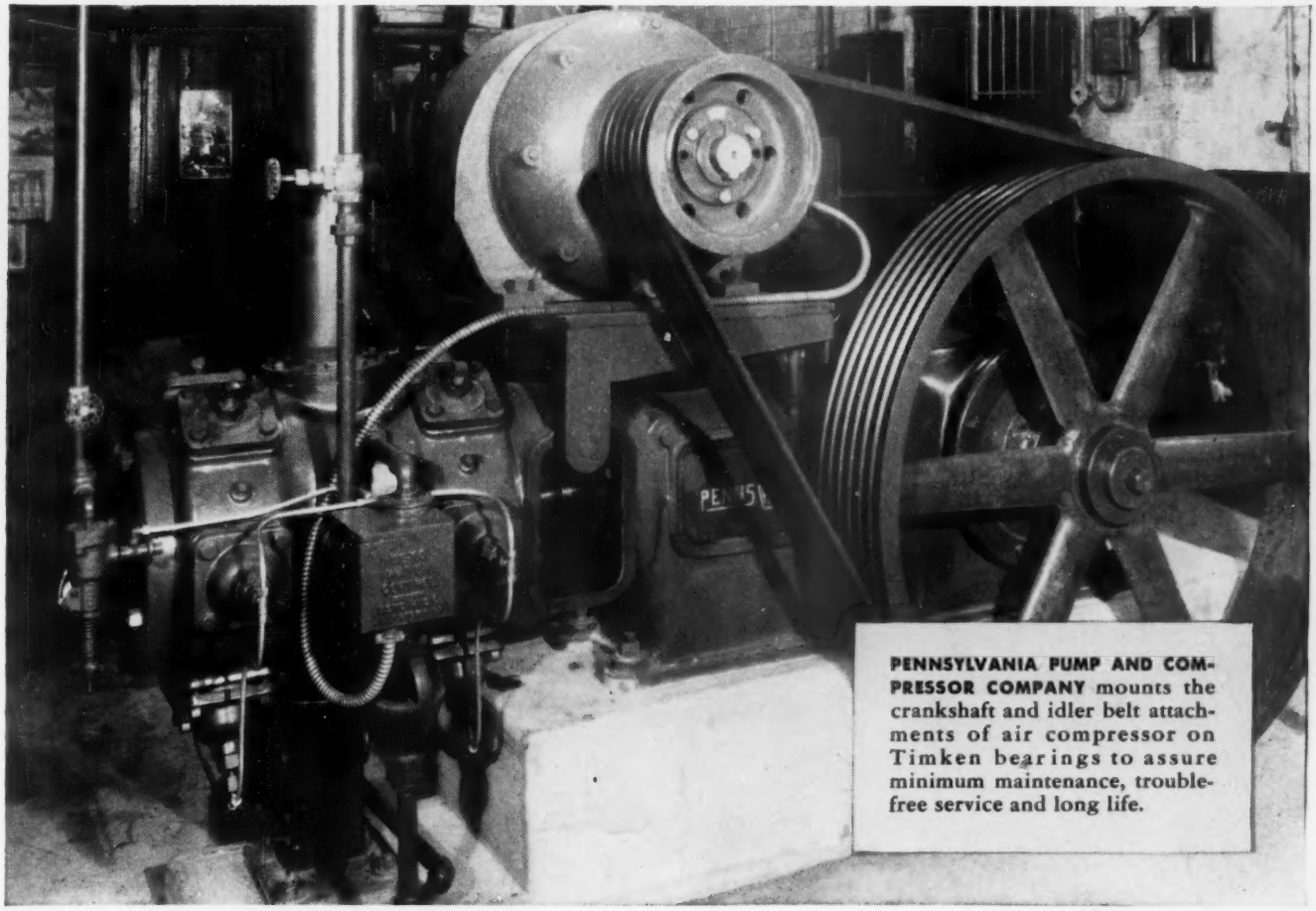
Timken bearings keep housings and shafts concentric making closures more effective. Result: Dirt, sand and moisture are kept out, lubricant kept in.

Because Timken bearings are manufactured to extreme precision limits and finished to incredible smoothness, they make friction practically negligible. And you're always assured of Timken bearings' quality because we make our own steel. No other U. S. bearing manufacturer does.

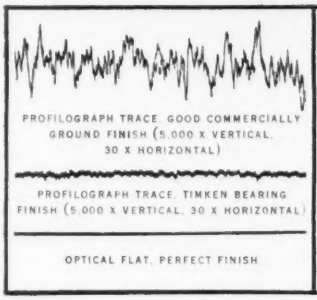
To get these advantages in the equipment you build or buy, always specify Timken bearings. Always look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN BEARING EQUIPPED

This symbol on a product means its bearings are the best.



PENNSYLVANIA PUMP AND COMPRESSOR COMPANY mounts the crankshaft and idler belt attachments of air compressor on Timken bearings to assure minimum maintenance, trouble-free service and long life.


PROFILOGRAPH TRACE, GOOD COMMERCIALLY GROUND FINISH (5,000 X VERTICAL, 30 X HORIZONTAL)
PROFILOGRAPH TRACE, TIMKEN BEARING FINISH (5,000 X VERTICAL, 30 X HORIZONTAL)
OPTICAL FLAT, PERFECT FINISH

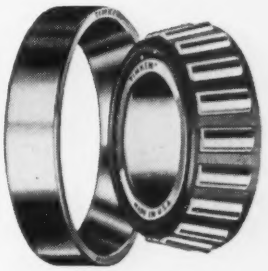
SMOOTH TO MILLIONTHS OF AN INCH

Surface finish of high quality Timken bearing rollers and races is so smooth that it takes a profilograph to measure its smoothness. This instrument measures surface variations to a millionth of an inch, as shown at the left.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⬭ AND THRUST → ⬭ ← LOADS OR ANY COMBINATION

You can double core production

yet cut core costs with

FOUNDREZ 7101

● When you switch from ordinary core oils to RCI's FOUNDREZ 7101 you can actually double your production of cores, at the same time *reducing* their cost per ton.

FOUNDREZ 7101 is a water dispersing, phenol-formaldehyde binder that enables you to bake cores in just about half the time of oil-bonded cores — without the addition of any extra oven equipment.

What's more, you get a superior core. Tensile strength and hardness are greater. Permeability is increased. Gassing is reduced. Hot strength is higher. Less cereal binder is needed. And shake-out is better, saving time and material in cleaning finished castings.

Get the full facts on FOUNDREZ 7101 by writing for Technical Bulletin F-1.

RCI

Creative Chemistry . . .
Your Partner
in Progress

REICHHOLD

Synthetic Resins • Chemical Colors • Industrial Adhesives • Plasticizers
Phenol • Formaldehyde • Glycerine • Phthalic Anhydride • Maleic Anhydride
Sodium Sulfate • Sodium Sulfite • Pentaerythritol • Pentachlorophenol

REICHHOLD CHEMICALS, INC., RCI BUILDING, WHITE PLAINS, N. Y.

giant cleaning jobs MADE EASY

5-Ton Loads Cleaned in Minutes with this Wheelabrator® Tumblast

Big Pay Loads — 10,000 pounds of steel castings spotlessly cleaned in from 12 to 20 minutes in a 63" x 96" Wheelabrator Tumblast . . . provide big savings for Maynard Electric Steel Castings Co., Milwaukee. As a result of the cost-reducing, speed-cleaning performance of this 70 cu. ft. capacity airless blast machine, Maynard was able to slash overall cleaning time 25% even with a 33-1/3% increase in casting tonnage.

Formerly all cleaning was done in three air blast rooms working two nine hour shifts . . . 72 man hours daily. All cleaning is now performed with only 54 man hours charged to the cleaning room. This reduction is due to the ability of the Wheelabrator Tumblast to handle pieces weighing up to 8,000 pounds each and to clean mixed loads weighing up to five tons.

Even though your cleaning requirements may not be on this large a scale, the airless Wheelabrator will provide improved cleaning performance at greatly reduced cost for any size problem. More than 6,000 Wheelabrators are now in operation. Write today for the complete story on this modern cost-cutting cleaning method. Ask for Catalog 74-B.

American WHEELABRATOR®

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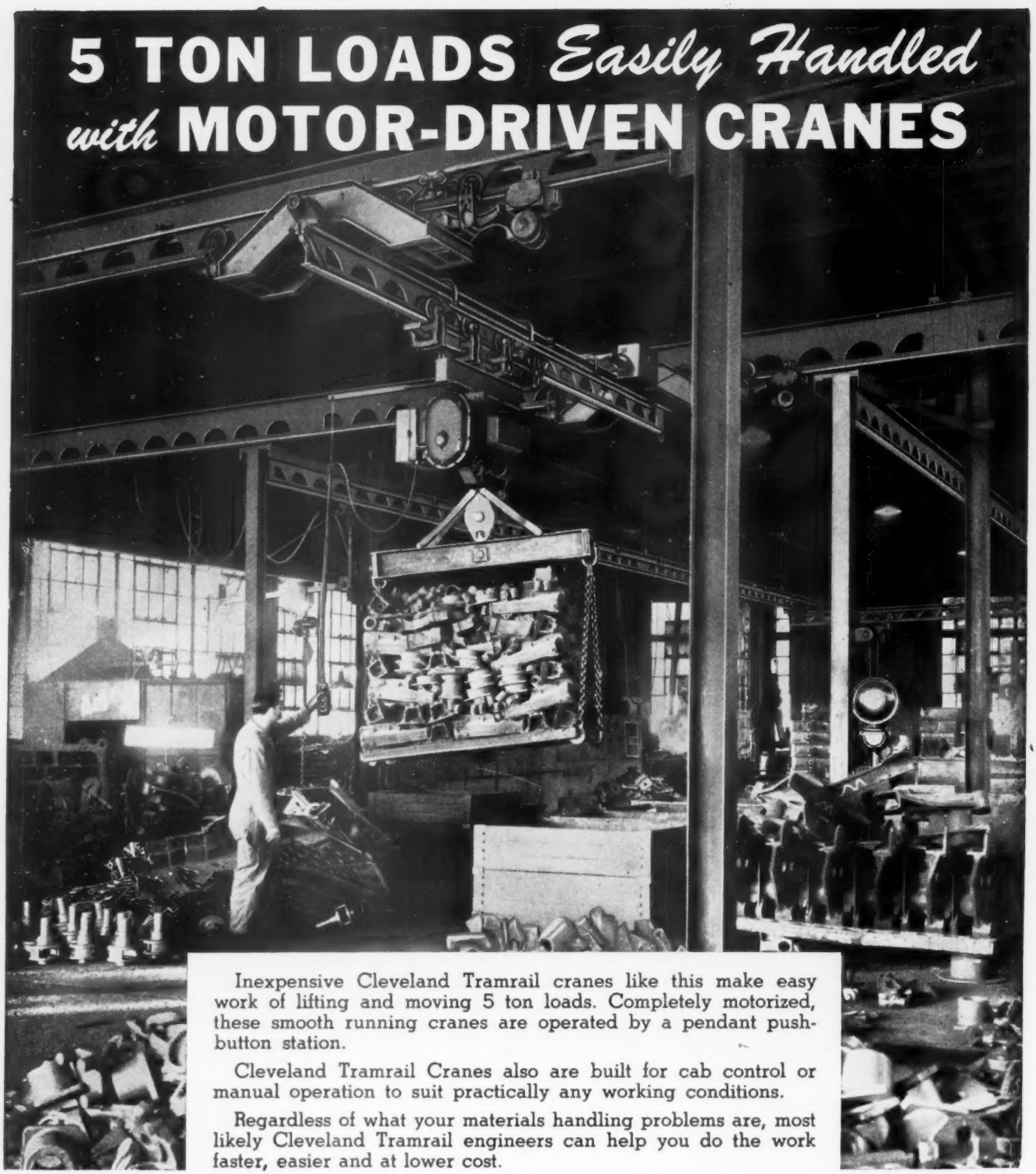

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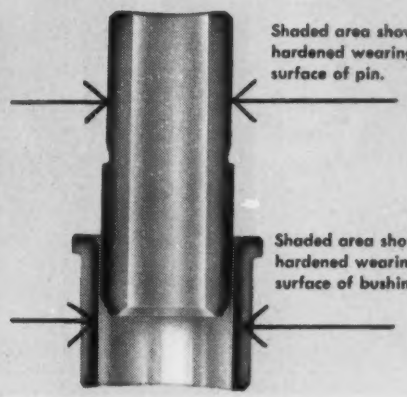

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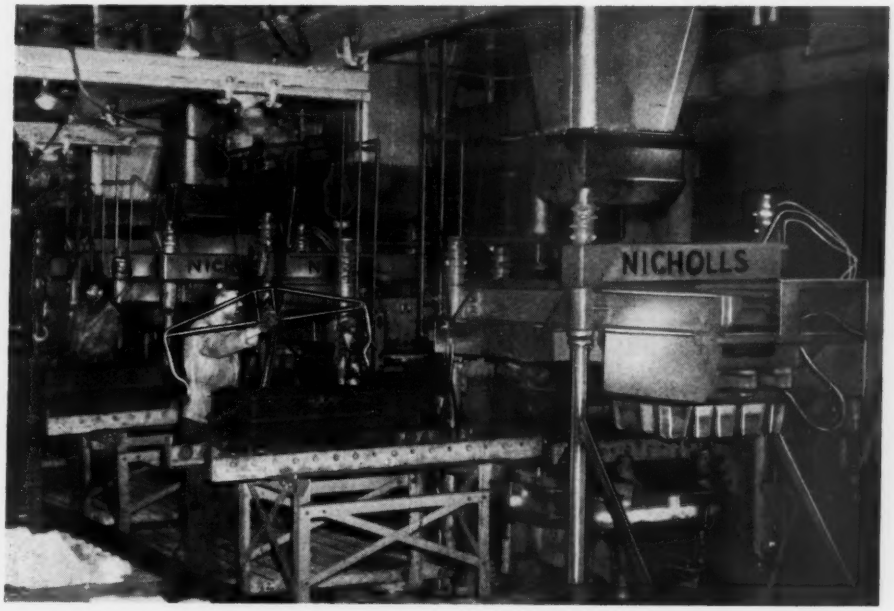

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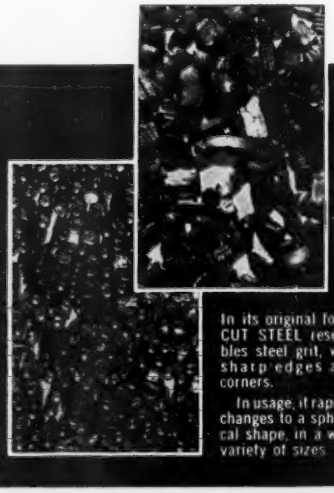

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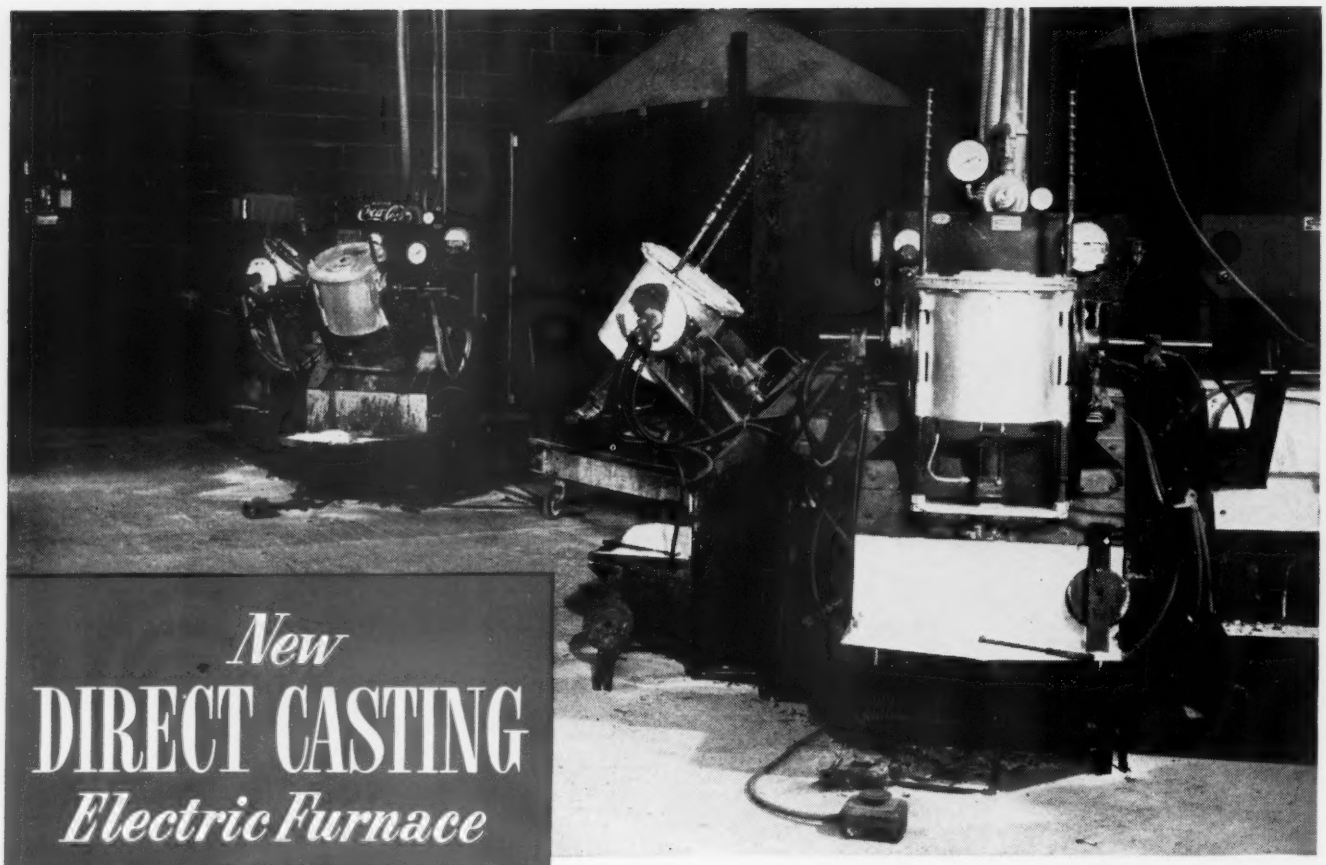

New DIRECT CASTING *Electric Furnace*

Above: Battery of Detroit IC Furnaces in precision casting foundry. **Below:** Workman ready to invert furnace for casting into attached investment.

Detroit Electric Furnace Produces 6-lb. Investment Castings In 7-13 Minutes *All Day Long*

This new Detroit Electric Furnace is designed for better, faster investment casting. There's no pouring, ladling or handling of molten metal. You get fast melting *plus* direct furnace-to-mold casting in one easy operation. Just charge and melt—when ready for casting, invert the furnace and pour directly into attached investment. Detach the mold and you're ready to repeat the cycle—in 7 to 13 minutes.*

Fast, controlled melting by indirect arc holds alloy variation and carbon pick-up to a minimum. Low power consumption, high utilization of heat promotes operating economy. Uniform results through melt after melt mean fewer rejected castings, greater over-all efficiency.

Investigate the advantages of this new high-production furnace for investment casting. Write today for details on the Type IC Detroit Electric Furnace.

*Typical Melting-Casting Data for Type IC-12KW, 10-lb. Detroit Electric Furnace.

Metal	Weight Charge	Over-all Melt-Cast Cycle	Power Consumption
Stainless Steel	6 lb.	13 Min.	.364 KW/lb.
Stellite	5¾ lb.	12 Min.	.340 KW/lb.
Gray Iron	6 lb.	12 Min.	.333 KW/lb.
Copper	6 lb.	8½ Min.	.203 KW/lb.
Yellow Brass	6 lb.	7½ Min.	.179 KW/lb.

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for *all* Metals and Alloys

THERMOTOMIC "X" COMPOUND is an exothermic material which is molded and baked into necked down riser cores and inserts. It produces a temperature of 3500° F. and is used as ring inserts under the risers or feeding heads. Great savings are realized through reduced riser dimensions and cleaning costs. In conjunction with Thermotomic Compounds, Carbon Free Liquidizer No. 5 should be used on top of the metal in the heads.

THERMOTOMIC ABC — For aluminum and magnesium castings, necked down riser cores and inserts—prevents piping and shrinkage into castings. Soffel's ALX-31 Liquidizer should be used on top of the metals in the head.

THERMOTOMIC "HoTop" LIQUIDIZER — for short risers—saves 60 to 70% of feeding metal in the heads.

EXOTHERMIC CARBON FREE LIQUIDIZER—A feeding head compound for castings and ingots of ferrous and non-ferrous metals—saves metal and prevents piping and shrinkage.

CARBON FREE LIQUIDIZER AL-X31—For aluminum and magnesium feeding heads—prevents piping.

EXOTHERMIC INSULATING SLEEVE CORE COMPOUND—For riser sleeves—adds heat and prolongs fluidity of feeding metal in heads or risers.

DENSILTITE LADLE FLUX—For iron and semi-steel — reduces sulfur and phosphorus. Adds fluidity and temperature in pouring ladles—produces clean iron.

SOFFEL'S NON-FERROUS FLUXES

BB-2—For red brass, nickel and tin bronze pressure castings—removes sulfur, iron, phosphorus oxides and gas from brass and bronze.

SUPER BRASS FLUX—For brass and bronze—prevents oxidation of zinc.

BRASS REFINING FLUX—For cupola melting and open flame furnaces — prevents oxidation. Produces liquid slag and faster melting.

COVERALL BRASS FLUX—Removes gas and oxides from yellow brass and nickel silver.

RADIOCLARITE BRASS FLUX—For open flame furnace melting—increases fluidity, tensile strength, removes gas, oxides and iron.

AB-6 BRASS FLUX—For electric furnace melting of brass and aluminum bronze—keeps furnace linings clean.

KLEEN-ALL BRASS CLEANER—For use in bottom of pouring ladles or open flame furnaces to absorb liquid slag and keep the furnace and ladle linings clean.

BRASS ALUMINUM REMOVER — Removes all traces of aluminum from copper, brass or bronze.

HI-LED BRONZE FLUX—Holds lead up to 50% in copper without use of nickel.

NICKEL MONEL FLUX — Removes gas and adds fluidity to metal.

ALUMINUM BRONZE FLUX—A perfect deoxidizer for reducing aluminum and iron oxide in manganese bronze and aluminum bronze. Adds fluidity.

COPPERTITE FLUX—For high conductivity castings—removes cuprous and cupric oxides and gas from copper.

FERRO-OUT IRON REMOVER—Removes free iron or alloyed iron from brass, bronze or copper.

SOFFELITE ALUMINUM FLUX—Removes aluminum oxide and iron from aluminum and increases the fluidity and tensile strength.

MAGNALUM FLUX—For magnesium and aluminum alloys—removes gas and oxide and increases fluidity.

KLEN ZINC FLUX—A deoxidizer and purifier for zinc base pressure die castings—removes gas, sulfur and iron.

DIE COATING—For pressure zinc base die castings —will not scale, blister or create gas in the molds.

PERMANENT MOLD COATING—For aluminum and magnesium castings—adds longer life to molds. Produces clean gas free castings.

POT COATING—For iron pot melting — increases life of pots. Prevents iron pick up.

U. S. Patents No. 2,490,327 and No. 2,500,097

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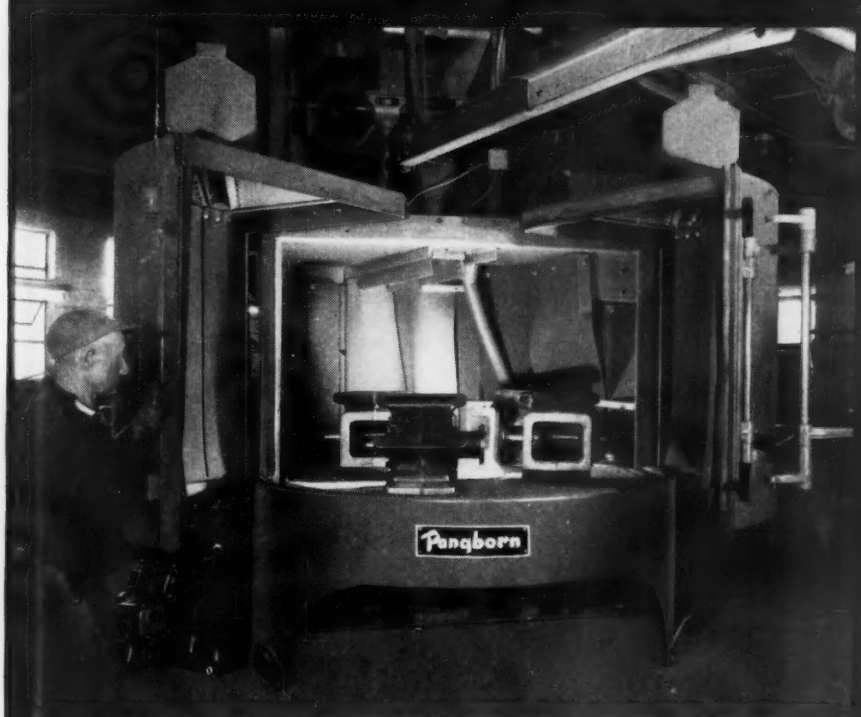

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*U. S. Patent 2184926 (other patents pending)

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Two Years of Change

Foundrymen talk considerably about changes that are taking place in the industry. Most of these comments are concerned with changes in product or in facilities for producing castings. Developments in machines, materials and methods usually occupy the spotlight.

But other interesting and important changes are under way constantly. An indication of some of these trends is provided in FOUNDRY's recent survey of the industry taken from data collected for the 1955-56 edition of *Penton's Foundry List* and presented on page 114.

Since the previous study two years ago, the foundry industry suffered the loss of 575 plants. While this mortality may be attributed by many to the slackening in demand for castings during 1954, basic causes probably were a long time in the making. In the main, these companies went out of business as a direct result of actions by the individual managements.

Lack of imagination in this changing world, inability to throw off tradition, antiquated practices, obsolete plant and equipment, unrealistic pricing policies, weakness in selling and changes in buying practices of customers are some of the reasons why a number of companies are not operating today. As the manager of one closed plant remarked, "Don't let your plant and equipment become obsolete if you want to stay in this foundry business."

The picture of change is not all dark. While some fail in the competition for a share of the casting market, others are trying a hand in this essential industry. As a result of new plants organized during the past two years, the net loss in total number of foundries in the United States and Canada was only 96. Although the industry had a slight loss in number of plants, mechanization, modernization and expansion of existing plants, plus some new high production foundries, undoubtedly resulted in increases in capacity for the industry.

Among ferrous foundries, losses are recorded in the gray iron and malleable iron. Here, the trend toward larger but fewer plants continues. A slight gain in the number of steel foundries probably resulted from more plants pouring high alloy steel in investment molds. Continuing the trend shown in 1953, copper-base, aluminum and magnesium foundries showed gains.

One of the most interesting changes emphasized in the study is the growth of casting processes which provide greater dimensional accuracy and better surface finish. Foundries using permanent molds increased from 657 to 761 in two years, with most of this expansion taking place in the aluminum castings field. Plaster molding is being used by 31 more foundries. Investment casting increased from 113 plants in 1953 to 143 at present, and recent reports indicate a continuation of that trend. The real impact shell molding has made on both producers and users of castings is emphasized by the fact that 422 plants report the use of that process today compared to 197 two years ago.

Yes, many changes are taking place in the foundry industry. Management surely has an interesting challenge in utilizing applicable changes for the progress and development of the individual foundry.

Frank G. Steinbach

Editor

Fig. 1—Before mechanization, molds were shaken out behind the molders. sand screened and tempered as used

Brass Foundry Modernization Raises

PLANT EFFICIENCY

By EDWIN A. SWENSSON and JAMES F. GALLAGHER
Edwin A. Swensson Co. Detroit Brass & Malleable Co.
Detroit

THE Detroit Brass & Malleable Works, located in the heart of the highly mechanized Motor City, has just completed a major improvement program in its brass foundry. The installation includes a completely mechanized molding and sand handling system and central shakeout unit.

The reasons for considering mechanization of the foundry were many. Located in a critical labor area, skilled foundrymen were often difficult to find. Quality castings, held to exacting specifications by customers, required close control of all phases of the casting operation. In addition, the demand for lower cost castings brought a pressing need for greater efficiency and higher production yields.

Fig. 1 illustrates the production facilities in the foundry just prior to complete mechanization. Flasks had been standardized at 12 x 18 in. with 3-in. cope and 3-in. drag. The molders set off their molds on short roller conveyor lines, stacked two high. In addition to being a strenuous job, pouring of the molds continually interrupted the molders. Actual production time per molder was then limited to about 5½ hours of molding. Indirect labor was required for shifting weights, dumping out the molds and shaking out the castings. The castings were then loaded and carted to the cleaning room. In addition, indirect labor would also screen and temper the molders' sand.

Sand control was difficult under these circumstances. Frequent re-use of the heap sand presented hot sand problems.

New Melting Units—The first step in the mechanization program was to install new melting facilities. Fig. 2 shows the indirect arc electric furnaces. There are three of these, each with a batch capacity of 1000 lb. Two types of brass are normally melted.

Melting temperatures range from 2200 to 2260° F. A lance pyrometer is used to check metal temperature just prior to pouring.

Individual charges are carefully weighed into tilted charging buggies and then elevated to a charging platform behind the furnaces. Incoming melting materials are in a straight-line flow from receiving point to completion of melting. Temperatures and melting times as well as power consumption are recorded accurately and controlled for each heat. Exhaust hoods over each furnace control the atmosphere in the melting department, and help to provide good working conditions.

Coremaking—Valve and fittings castings require intricate yet somewhat delicate cores. Many are pasted and assembled prior to use. Coreroom efficiency has been improved by adapting as many jobs as possible to core blowing.

Very accurate control of the core sand is made possible by the use of all washed and dried sand. Two mixes are used, one for blowing and one for hand ramming cores. A conventional muller type mixer with a 400-lb batch capacity provides intensive mulling and maximum physical properties from the binders. Bank and sharp sand is varied with the work being performed.

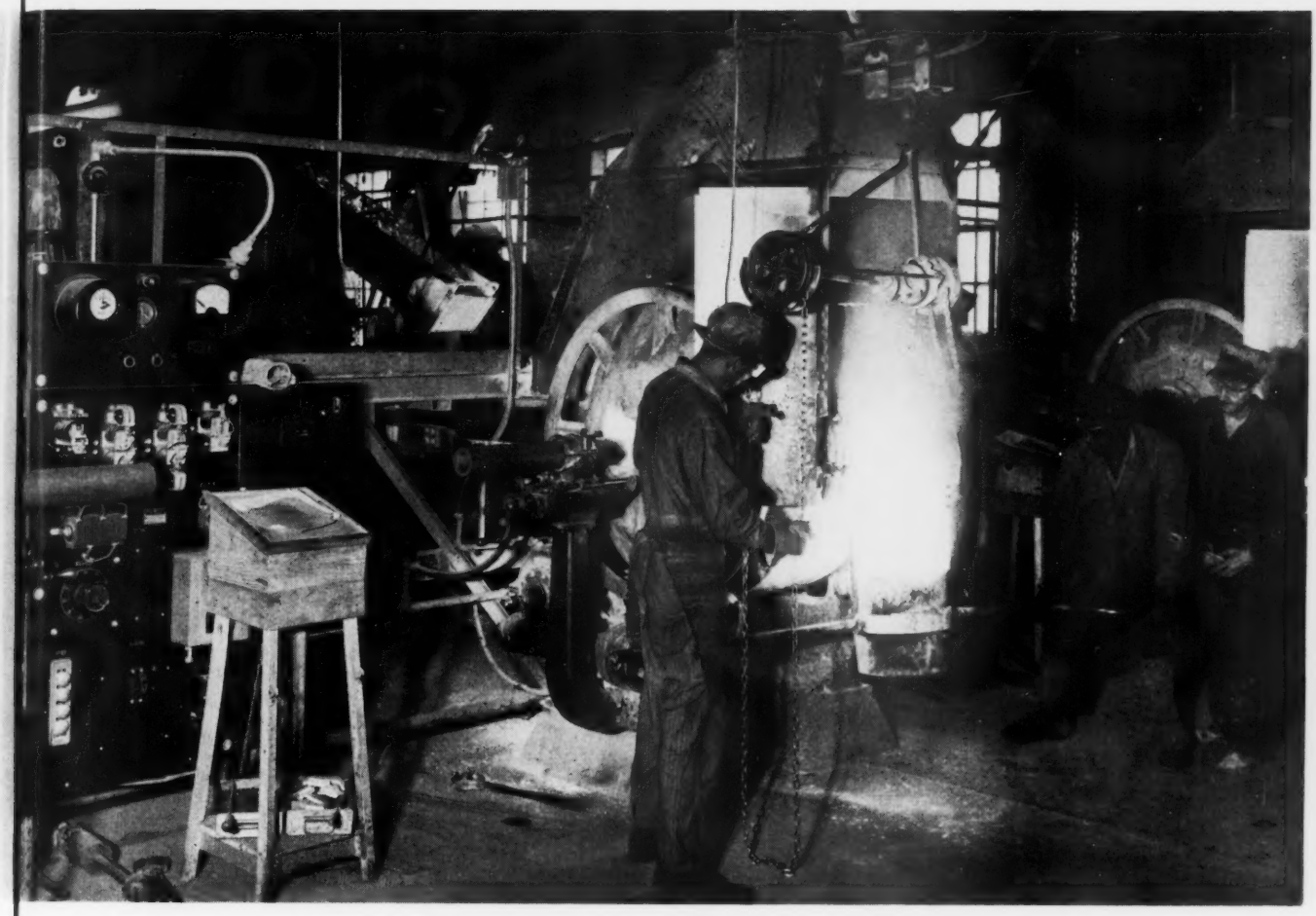


Fig. 2—Electric furnaces are used for close control of temperature and metal analysis. An elevated charging platform is used when charges are weighed and tabulated

Fig. 4 shows the compact and workable arrangement of the core room. Two rolling drawer core ovens are used, each having five shelves. The back of each drawer becomes a seal for the oven when that drawer is open. Cores of various baking times are classified on various shelves at the oven to permit the most efficient use of the heat input.

Core cleaning, pasting and assembly benches are located adjacent to the oven; the same ovens are used for re-dry of the pasted assemblies.

Here also, exhaust hoods over the oven loading station as well as the "smoke-off" area maintain working conditions consistent with an efficient foundry operation.

Cores are loaded onto racks and then transported to the molders on a spring-mounted cart.

Sand Preparation and Handling—The subsequent and major step in the improvement program was to complete the installation of an over-all sand preparation and handling system, complete with overhead sand and co-ordinated pouring zone, and a shakeout and castings handling system.

A cardinal demand by management was that this installation be completed without interrupting production. This was accomplished by moving the molders to one end of the foundry while foundation work and installation proceeded at the other.

The sand preparation system was located outside the present building to make the maximum

Comparison of Molders' Work

BEFORE MECHANIZATION

Molder Operation	Pounds Lifted	Pounds Moved
Shoveling sand	11,250	11,250
Mold set-off	12,750	12,750
Pouring	1,800	2,600
Clean up spill	1,050	1,050
	26,850	27,650
		26,850
Total weight		54,500

AFTER MECHANIZATION

Molder Operation	Pounds Lifted	Pounds Moved
Shoveling	None	None
Mold set-off	19,400	19,400
Pouring	None	None
Clean up spill	None	None
	19,400	19,400
		19,400
Total weight		38,800

Fig. 3—Electric indicators in each hopper automatically raise and lower plows on prepared sand belt conveyor. This view shows automatic plow

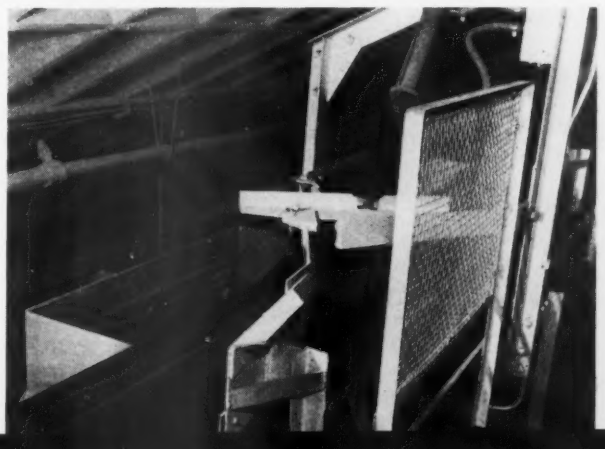


Fig. 4—Coreroom was designed to handle a large volume of small cores. Driers are used to support intricate elbows and bends. Blowers are used for peak production. Two rolling drawer core ovens are used, with five shelves in each. When a drawer is open, its back seals the oven

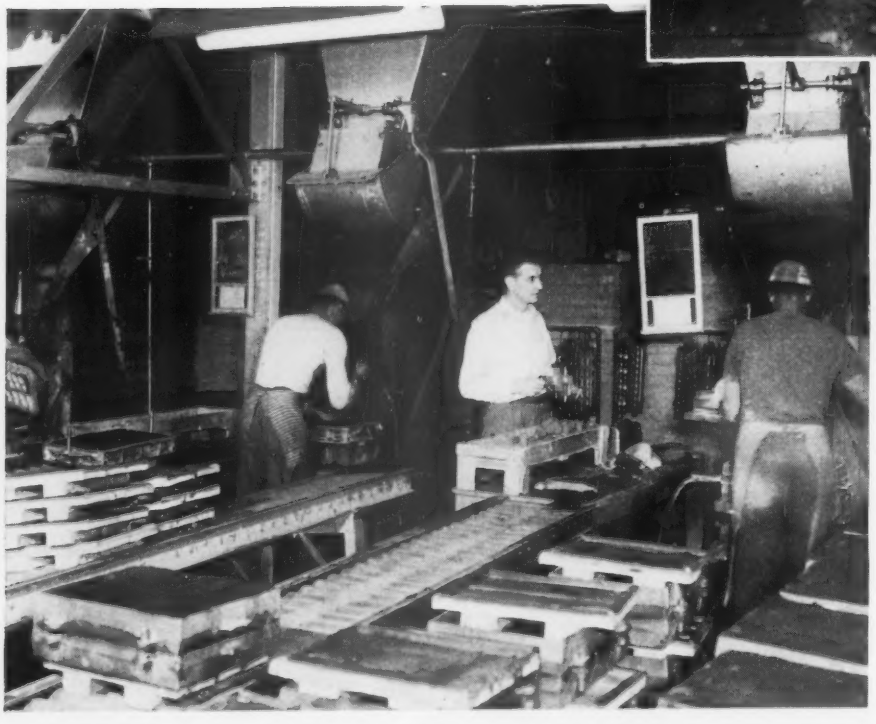


Fig. 5 (above)—Each molder has two lines of roller conveyor for mold storage, with spring-mounted mold clamps, and one return line for bottom boards and flasks. Molds are poured by a special crew

Fig. 6 (left) — Each of the eight molding stations has a 1½-ton capacity overhead sand hopper. Pivoted chute below jaw of hopper gate eases sand into molds

Fig. 7—Mold storage lines terminate at central shakeout system. Fumes are exhausted by smoke hood, over a double-decked vibrating conveyor

use of available floor space. Shakeout sand from the overhead storage bin is charged to the mixer in 1500-lb batches. One man controls the mixing of 160 tons of sand per day. By means of a belt conveyor under the mixer and below the floor, the prepared molding sand is fed to a bucket elevator and then to a main distributing conveyor which services the eight molding stations.

A belt type aerator mounted above the belt conveyor thoroughly aerates the prepared sand while it is enroute to the molders' hoppers. Maximum flowability is thus obtained after the ramming effects of the elevator and conveyors.

Plows at the hoppers are operated automatically. The level of the sand in each hopper energizes a solenoid valve, which raises or lowers the plow according to the demands of each molder. A remote control panel is observed by the mixer operator, and he can interrupt the automatic operation should it be necessary. Fig. 3 shows the unattended automatic plows. Safety guards are provided for each plow section.

Each of the eight molding stations has an overhead hopper of 1½-ton capacity. Any over-supply of sand on the distributing conveyor is directed to the conveyor below the floor and returned to the system. The single jaw gate on the hopper feeds the sand onto a pivoted chute below the jaw of the gate which eases the sand into the mold, thus preventing ram-offs. This chute can be seen in Fig. 6. When the molder closes the gate of the hopper he allows the pivoted chute to return to a horizontal position, which it does by means of a counterweight. In this position it positively blocks the hopper gate and prevents sand spillage into the mold at the critical time of closing the mold.

The molding machines are bolted to a spill grate over which the molders work. Sand from the strike-off operation is also returned to the sand system.

After completing the molds, the molder sets them off onto the roller conveyor lines. The lines are long enough to permit him to continue molding in the event a particular heat is delayed.

Each molder has two lines of roller conveyor for mold storage and one return line for bottom boards and flasks. Molds are poured as shown in Fig. 5 by a special pouring crew. This permits the molder to use his time in making molds. The pouring crew takes the heat off at the furnaces, checks the temperature and then pours off the molds. Automatic weight lifters are installed along the length of the roller conveyor.

Shakeout—Poured molds are allowed to cool and then shaken out into a vibrating conveyor which is completely housed and exhausted (Fig. 7). Sand and castings travel to the end of the conveyor where they must pass over a screen section of the conveyor. At this point the sand falls through the screen onto a belt conveyor located in a pit in the foundry floor. The separated castings are directed to the cleaning and sorting stations. Meanwhile, the shakeout sand crosses under the foundry and is conveyed to the spill sand belt.

Design of this combination spill sand and hot sand conveyor permits the handling of both sands without allowing the hot steam and gases to travel upwards and disturb the molders. Also, this conveyor is equipped with an electro-magnetic pulley to remove tramp metal.

Screening is accomplished above the storage bin where core butts and nonmagnetic materials are removed from the sand while screening to the desired mesh. Fines are removed here also by a housed and exhausted enclosure.

The collapsibility of the cores upon shakeout determines the amount of sand that will daily enter an otherwise closed sand circuit. This sand will be re-used after being properly bonded at the mixer. Since the base sand used in the coreroom becomes also the base sand in the foundry, the selection of core sand was a prime consideration during the transition to the mechanized system.

Sand testing as well as sand control facilities have been made an integral part of the project. Sand control now is the responsibility of one man, and daily checks are made so that required adjustments can be made well in advance of molding.

The results of mechanization are immediately apparent in the foundry. Melting and pouring operations are under centralized and effective control. Sand quality is uniform and controllable. Molders' work is less fatiguing because operations formerly required have been eliminated. See the accompanying table for a comparison of labor.

Also, the new shakeout facilities confine this operation to a central location and permit more effective exhaust of smoke, gas and dust. Molders thus are enabled to work in a clean atmosphere and concentrate their efforts on molding.

Fig. 1—A two-stage phenol formaldehyde resin in dry powder form is mixed mechanically with the sand in the blending equipment shown here

NEW CENTRIFUGAL PROCESS

Uses Sand-Resin Lining

Two centrifugal methods are in common use, one using a steel mold and the other a metal flask with a rammed sand lining at least 2 in. thick. A new process described in this article combines the advantages of both

By EDWIN BREMER
Metallurgical Editor

THE largest tonnage of castings produced by the centrifugal process consists of gray iron pressure pipe. In that production, two different centrifugal methods—each possessing certain advantages—are employed.

In one process, the molten iron is poured into a water-cooled, rotating steel mold which is protected by a thin coating of some powder or sprayed slurry. The pipe subsequently is annealed at 1500° F or higher to eliminate carbides from the chilled iron. Rapid solidification of the metal results in a fast production rate.

The other method employs a metal flask containing a rammed sand lining at least 2 in. thick. While it produces pipe with a typical sand-cast gray iron structure that does not require annealing, the production rate is retarded by the relatively slow metal solidification. The protective sand lining results in an indefinite flask life, in contrast to the limited life of the metal mold used in the other process. However, this also necessitates a ramming operation and sand handling and conditioning.

The Mono-Cast Process—Most recent develop-

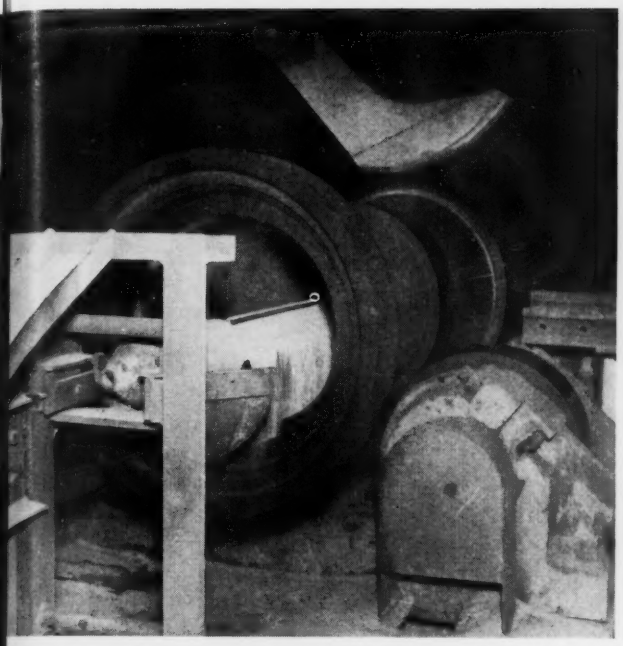


Fig. 2—Trough holding lining mix extends length of mold. It is inverted, and rotation places mix

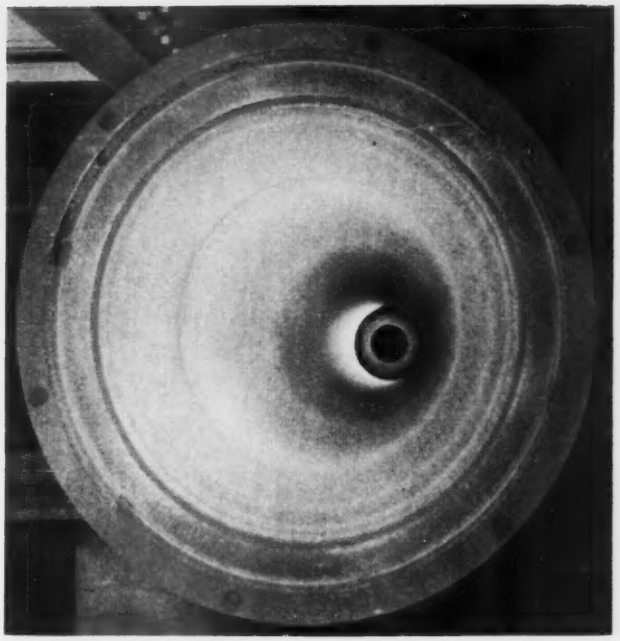


Fig. 3—Appearance of a newly lined mold after curing, which requires only one or two minutes

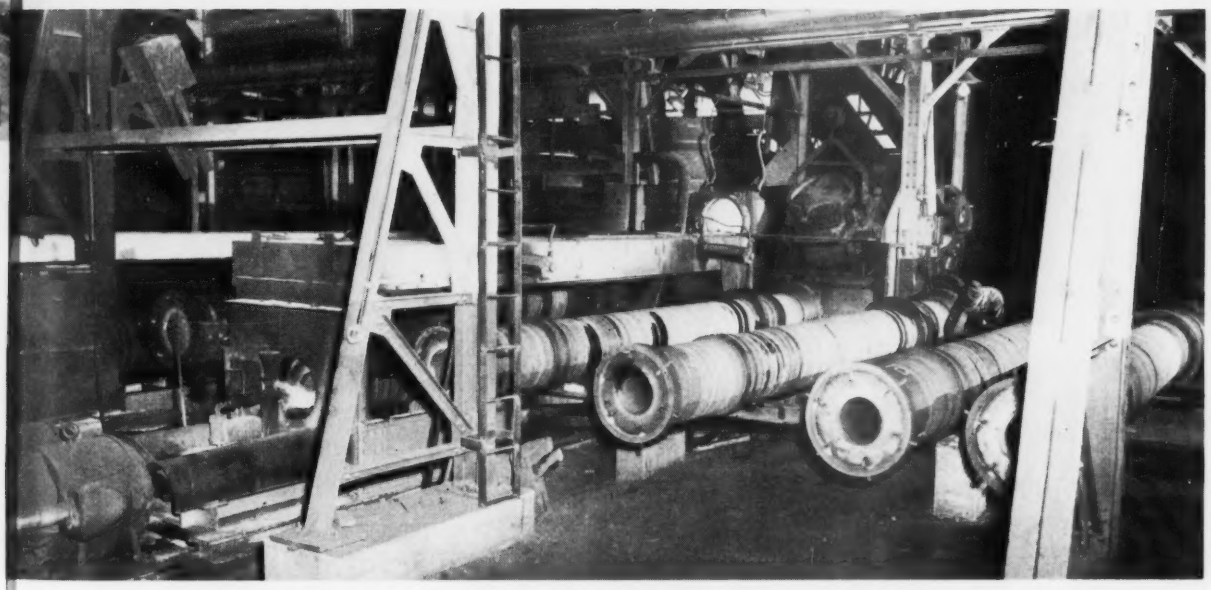


Fig. 4—General view of a casting station. Infrared-sensitive electric eye sighted on near end of mold is employed to actuate acceleration when the molten metal reaches the end of the mold opposite the pouring end

ment in centrifugal casting of pipe is a procedure which combines the advantages of the two older methods. This new process, here described publicly for the first time, employs a metal flask lined with a thin coating of resin-bonded sand. Developed by the American Cast Iron Pipe Co., Birmingham, it is known as the new Mono-Cast process.

Flasks essentially are steel tubes with a wall thickness at least three times that of the castings to be produced. The tubes are perforated with holes $\frac{1}{8}$-in. in diam at the inner face and $\frac{3}{8}$-in. in diam at the outer periphery, spaced from 3 to 8 in. apart. The centrifugally placed sand-resin lining, while only $\frac{1}{16}$ to $\frac{3}{16}$-in. thick, permits fast solidification and high production of pipe. Moreover, the metal has a gray as-cast structure.

Spinning bands for flask rotation and adaptation of the ends of the flask for affixing the bell core and stop-off plate are the same as in the older sand-lined flask process. The flask is vented to permit ready escape of gases from the resin-sand lining. Experience to date indicates that mold life may be indefinitely long.

Sand Is About 100 Grain Fineness—Sand used

Fig. 5—View of the inside of the mold shows start of pour. It was taken from the far end

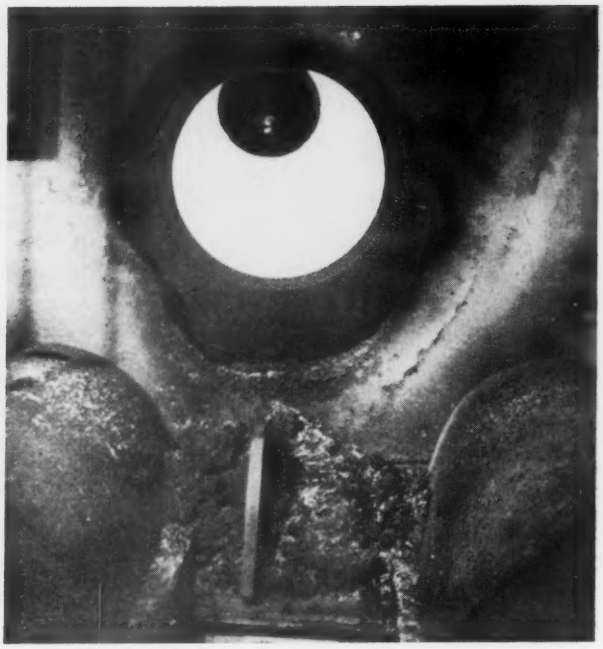


Fig. 6—This view, taken like the one in Fig. 5, shows inside of mold on completion of pour

for mold lining is preferably a clean, dry silica sand with an AFS grain fineness of about 100, with 70 per cent on screens 70 through 200. A two-stage phenol formaldehyde resin in dry powder form is mixed mechanically with the sand in blending equipment (Fig. 1). Normally 2½ per cent resin is sufficient to form a strong dense flask lining when the mixture is cured.

The resin-sand lining withstands the erosion of molten iron during the casting operation, but shortly after pouring the resin begins to deteriorate and burn out so that the pipe can be removed rather easily. A hydraulic ram (Fig. 7) pushing on the plain end of the pipe opposite the bell end is used to start the stripping, which is completed by a pipe puller. In some operations where the pipe is stripped very hot, controlled cooling in a stress-relieving oven is desirable for best properties.

The metal flask with some adhering resin-sand lining proceeds to a clean-out station where a rotating brush (Fig. 8) is advanced automatically through the slowly revolving mold. This removes all traces of the used lining and permits application of a smooth and even new lining. The number of molds in the system is adjusted to the production rate so that in continuous operation the flask temperature at the lining station is at the desired temperature of 350 to 400° F. Provision is made for flask cooling or heating as required to assure the best temperature for curing each new lining.

Lining the Flask—At the lining station the hot flask is placed in a spinning machine and a detachable stop-off plate is placed at the spigot end. This prevents loss of lining material and provides a square edge at the end of the lining at this point. While a similar plate may be placed at the bell end, it normally is not necessary. Rotation of the flask then is begun and a U-shaped metal trough, extending the full length of the flask and containing the proper amount of resin-sand to produce the desired lining thickness, is centered inside the flask. The trough is inverted quickly to place the lining mixture uniformly throughout the length of the mold, and the rotation distributes

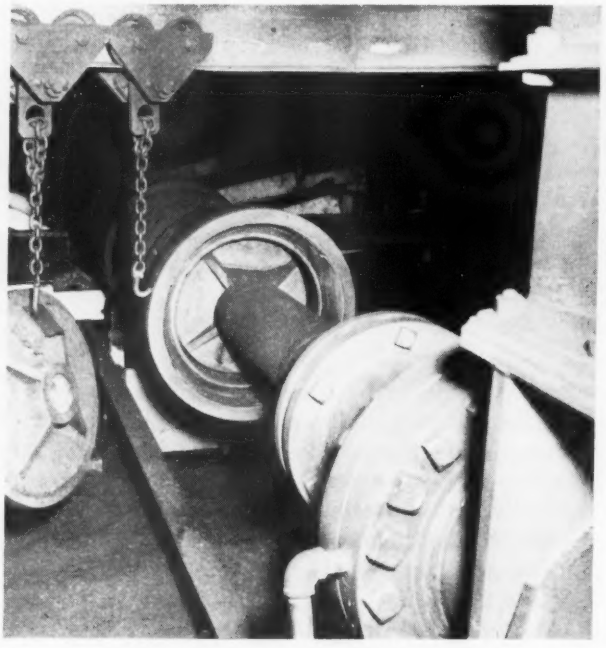


Fig. 7—Hydraulic ram starts stripping by pushing on plain end. A pipe puller completes job

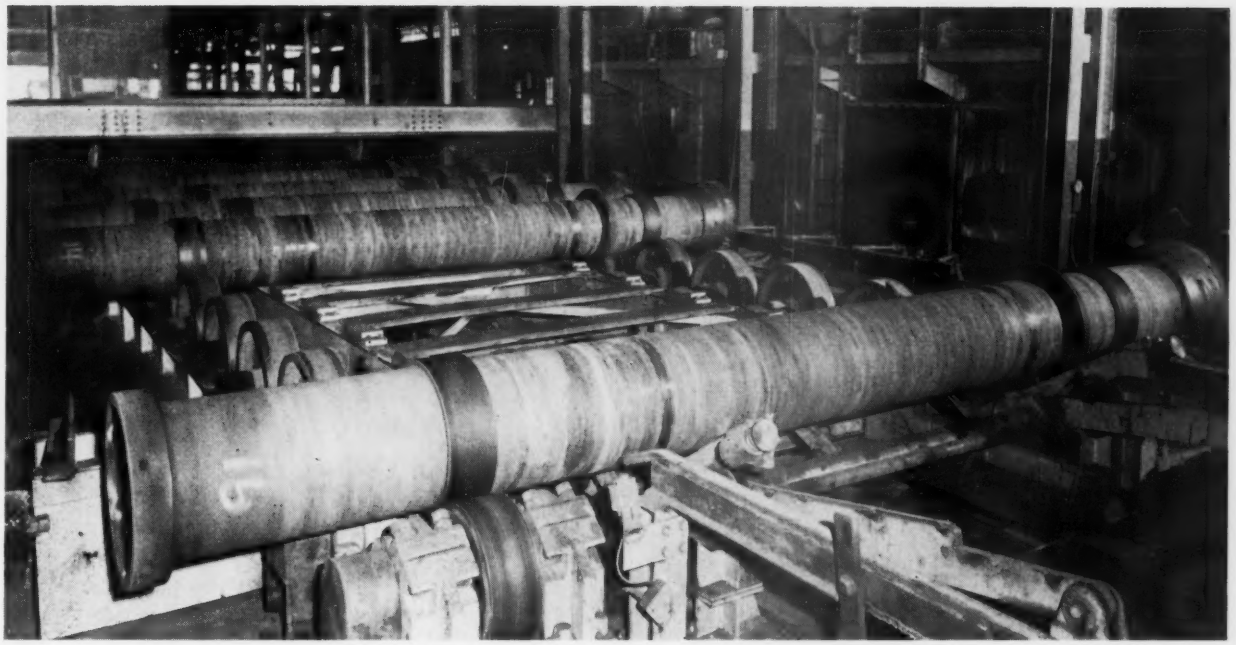


Fig. 8—At clean-out station, a rotating brush is advanced automatically through the slowly revolving mold and removes all traces of used lining

it circumferentially over the inner surface of the flask. In one to two minutes the whole lining is cured, the trough is withdrawn and the mold removed from the spinning station.

Procedure for lining the flasks varies according to the diameter of the pipe being produced. With small pipe the speed of rotation is about 50 rpm. With larger pipe the lining operation is performed in two steps. First a plain resin-sand mix sufficient to form one-half the lining thickness is dumped in while the flask is rotating at about 375 to 525 rpm. Then the speed is accelerated to 675-790 rpm and the remainder of the lining thickness is completed by using a resin-sand mix containing small amounts of graphite and iron oxide. With small pipe the sand lining additionally may be faced with a dry material formed of fine silica sand, carbonaceous material and thermosetting resin.

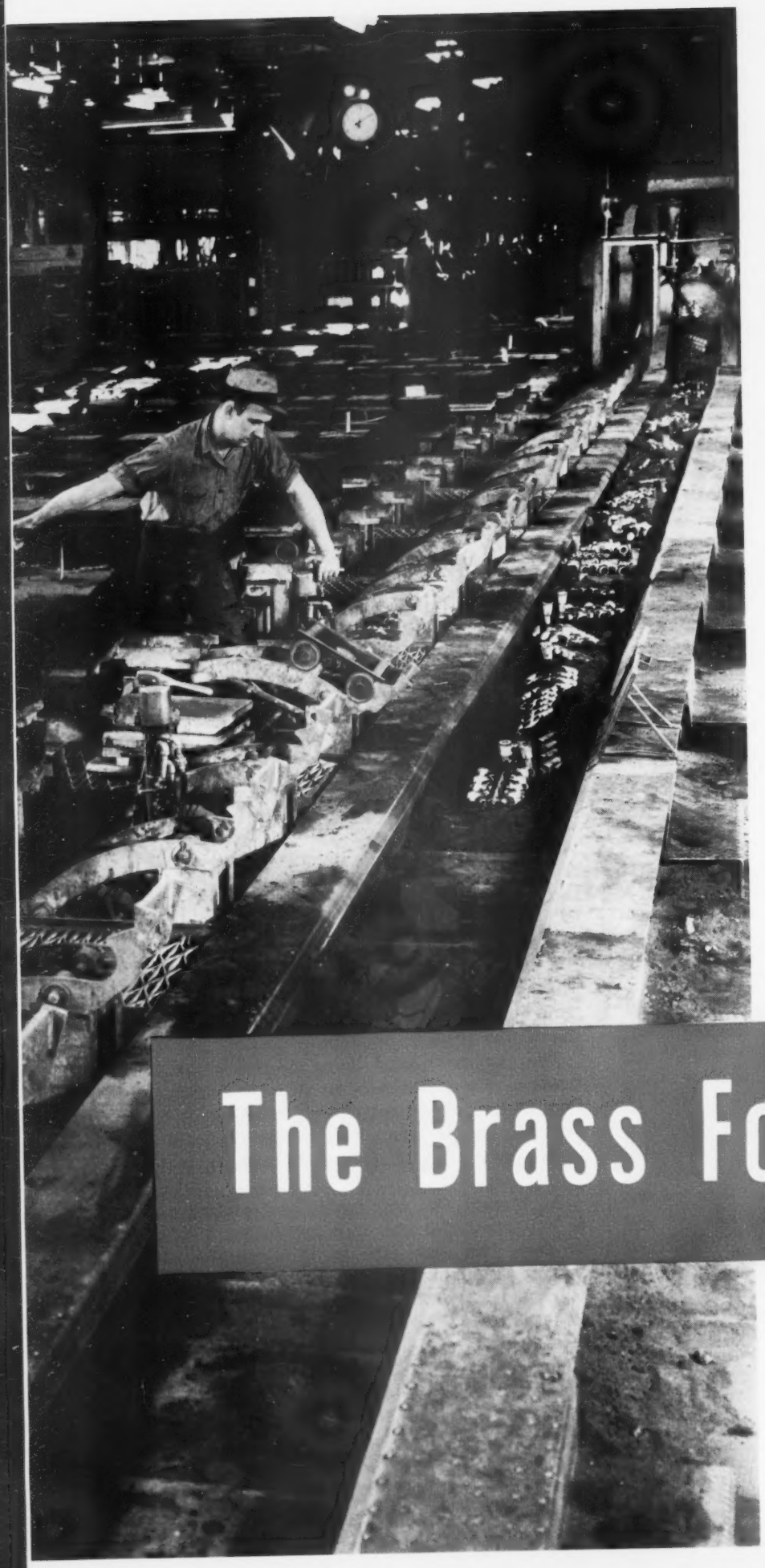
The mold then is fitted with the bell core and stop-off plate at the spigot end. The bell core is a conventional oil-sand socket core faced with blacking. Stop-off plate is provided with an annular groove filled with resin-sand mix to prevent chilling of the pipe end.

Casting the Pipe—Standard casting practice for 16-in.-diam pipe 20 ft long is to pour the metal through a short orifice spout extending through the bell core into the end of the mold. During pouring the mold is revolved slowly at about 25 rpm. With this slow rotation the molten iron simply flows along the bottom of the mold, which serves as a trough for longitudinal distribution. Also, this procedure permits any loose particles of sand and the slag to float on top of the molten metal and prevents them from being trapped against the mold lining or within the metal.

Molten metal reaches the opposite end of the mold in 5 to 10 seconds whereupon the mold rotation is accelerated rapidly to about 550 rpm. This causes the mass of metal to be thrown onto the mold wall so that the cylindrical pipe is formed almost instantly. Mold acceleration can be started automatically after a timed interval from the start of pouring. In one installation (Fig. 4) an infrared-sensitive electric eye is employed to actuate the acceleration when the molten metal reaches the end of the mold opposite the pouring end. When the metal throughout the section reaches approximately the liquidus temperature, the mold speed can be reduced. A short time after the solidus temperature is reached rotation is stopped and the casting cycle is complete.

The thin resin-sand lining decreases the solidification rate sufficiently so that the exterior surface of the pipe is not chilled. However, it is considerably greater than with the conventional sand-lined flask method, and production is increased proportionately.

At present the new centrifugal casting process is in commercial operation producing 2 and 2¼-in.-diam cast iron pipe in 12-ft lengths and 14, 16 and 20-in.-diam pipe in 20-ft lengths. Metallographic structure of the pipe is type A graphite—somewhat finer than that produced by the conventional sand-lined mold process in a matrix which is predominantly pearlitic. Bursting strength, crushing strength, beam strength and impact strength of pipe produced by the new process are at least equal to or better than that of pipe produced by other methods. The process also has been found to be applicable to the production casting of carbon and low alloy steel tubes, stainless steel tubes and some nonferrous alloys.



Men... Machines... Metal and Sand in...

The Brass Foundry

By HARRY ST. JOHN
Foundry Consultant

This is the first of a series of articles directed primarily to the producer of copper-base alloy castings. It and succeeding discussions will detail how casting costs can be cut and quality improved through the possibilities inherent in these four elements: Men, machines, metal and sand.

The author, formerly superintendent of nonferrous foundries, Crane Co., Chicago, is widely known as an authority in his field. He is a past chairman of the Brass and Bronze Division of the American Foundrymen's Society. In 1947 he was awarded the William H. McFadden Gold Medal of the AFS for outstanding work in nonferrous casting research.

HARRY ST. JOHN

THOSE of us in the business of making metal castings in sand molds must face the fact that we encounter competition from many directions. To make our livelihood we have to compete not only with those who are in the same business as ourselves, but also with those who use other methods to produce metal parts capable of replacing our product in a competitive market.

For a number of reasons this applies more to the nonferrous foundry than to other branches of the foundry industry. In what follows, particular reference will therefore be made to nonferrous practice, and the commonly-used term "brass foundry" will be used for the sake of simplicity to include everything from manganese bronze to monel.

Two Advantages—The sand foundry has two basic factors in its favor. Its method of production is the simplest and the materials with which it works are the least expensive. The repetitive process of making sand molds may seem costly, but certainly molding sand is cheaper than anything which can be substituted for it. Furthermore, since most methods of making metal parts start with molten metal, the simplest procedure is to cast that molten metal directly into a finished article, thereby avoiding the series of intermediate operations which characterize fabricating processes.

Let's be honest with ourselves. Until recently, the foundryman has been content to make a crude product by antiquated methods. As a result, the foundry industry has lost ground which need never have been lost and, in spite of some improvement, has not regained any great part of its losses. Forward-looking foundrymen realize that, if this trend is not to continue, the industry must make full use of its basic advantages to meet competition with respect to both cost and quality. The fact is that competing methods, in spite of their inherent handicaps, often produce a more nearly finished article at lower cost.

How can the foundryman meet this situation? What does he have to work with? The prime factors at his disposal are listed in the title of this article: Men, Machines, Metal and Sand. Reduced costs and improved quality depend upon taking full advantage of the possibilities inherent in these four elements. This and succeeding articles will show how this can be done.

Making Labor More Productive—At present wage levels, the cost of a man-hour is more than 200 per cent higher than it was a few years ago. Possibly this level has become stabilized; possibly it will increase still further; certainly no reduction is in sight. In the average foundry the cost of labor is a predominating factor. This condition can be met only by making labor more productive. Naturally, good working conditions and friendly employee relations are "musts." Incentive pay is one effective means for getting more results per man-hour. Profit-sharing plans have, in some instances, been successful. But above all, it is important to provide our working force with better mechanical facilities. Duplication of effort and excess handling have to be eliminated.

What is automation? Its ideal would be a plant, no matter what its size, in which there would be only one man who could be classed as direct labor. This man would stand, or more probably sit, on a platform, surrounded by pushbuttons, switches and recording instruments. There he would control an endless flow of materials on conveyors and through machines, right down to the finished product, wrapped and packed for shipment. In such a plant, of course, the ratio of so-called nonproductive labor to productive labor would be extraordinarily high. There would need to be a considerable staff of maintenance men, planners and inspectors. Something approaching this ideal currently is in actual use in a number of foundries, with production in molds per hour quite fantastic by former standards.

However, complete automation is not the thing for the average foundry, perhaps not for any brass foundry. Automatic machines and conveyors are costly and must be kept busy without interruption if the overhead expense is to be held at profitable levels. To avoid interruption, skilled maintenance men must be constantly on the job even though they are necessarily idle much of the time. Pattern changes and alloy changes result in unavoidable interruptions but must be infrequent. The ideal would be a foundry using one pattern, day

in and day out with never a change of product or alloy. Brass foundries seldom approach such an ideal.

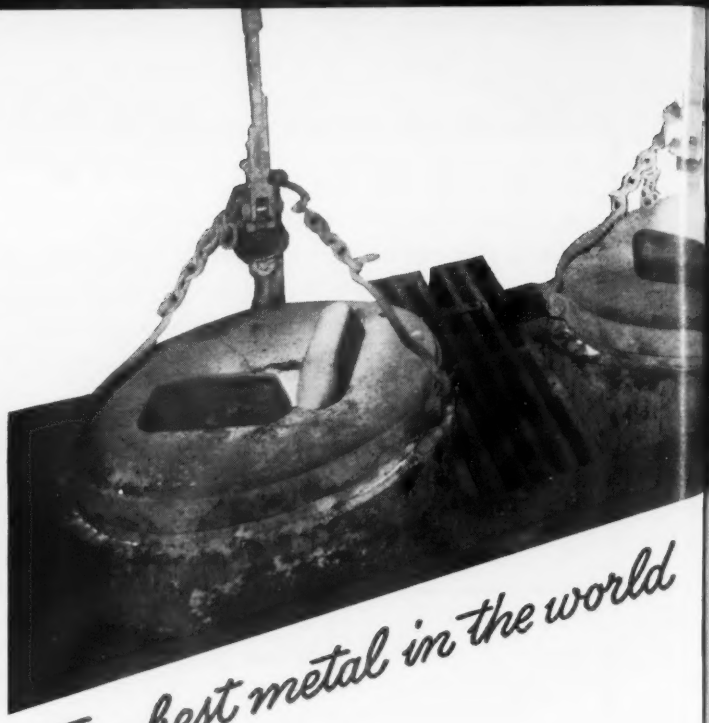
The foundryman who wishes to make most economical use of his labor must study his own situation with utmost care. No two foundries have exactly the same problems. Almost any foundry—production or jobbing—will find it possible to increase the productivity of its labor by substituting mechanical devices for some of its manual operations. Streamlining the flow of materials and product is an essential part of such a study. As suggested above, mechanization can be overdone. For any foundry there is a profitable compromise between theoretical perfection and uneconomic waste of manpower. It may be found, for example, that there is a spot where a man with a power-driven lift truck will do just as well as an expensive conveyor with a high overhead and maintenance cost.

Molding Methods Changing — The making of molds is going through a period of transition. In the conventional foundry of the past and present, the molding machine is used for only a fraction of the time required for making the mold. The rest is manual. Consider, for example, a 12 x 18 in. mold requiring eight cores. Good production would be 30 to 35 molds per hour. The molding machine is in operation about 20 seconds per mold. It has been proved that a molding machine can produce up to 300 or more half molds per hour if suitable facilities are provided. So, far from being overworked, the man who operates such a machine has little to do except watch it work. No plan for a production foundry should consider less than 100 completed molds per hour for each molding machine operator. Handling the molds after they are made, setting cores, pouring, cooling, shaking out and disposing of the castings becomes the real problem.

It is evident that a small jobbing foundry, with a production based on two of this and twenty of that, can hardly maintain such a pace. And yet it will be found that much labor can be saved if production principles are used so far as they can be made to apply to smaller and more diversified operation.

In many cases other casting methods are enjoying an advantage over green-sand molding because they produce a finer finish and closer dimensional tolerances. Die casting, precision casting, plaster molding and shell molding each has its legitimate field of use, but in many instances these processes have gone beyond their natural boundaries at the expense of conventional green-sand casting. So-called high-pressure molding, where a flexible diaphragm is used to press the mold, is a green-sand method which should also find its proper place without unduly replacing traditional practices.

Actually, the challenge offered by these new methods may well furnish the incentive needed to stimulate conventional green-sand molding to produce the results of which it is capable. For example, most foundry patterns are sloppy, in the sense



that they allow far more finish than necessary; the theory is that surface imperfections can thus more readily be removed. It costs money in the machine shop to remove excess finish and at the same time the casting suffers by the loss of its dense outer skin. The foundryman would be well advised to avoid surface imperfections rather than to depend on a machine to remove them. It has been demonstrated that the best performance of shell or high-pressure molding can be duplicated by calculated control of molding sand properties, pattern design and molding pressures. This is not to say that these newer methods do not have their place in the industry, a place which will be more fully discussed at another time.

Alloy List Is Long—All casting methods use metal, and in the brass foundry the list of alloys is long. Many of them contain four or more intentional components and a variety of unavoidable impurities. In combination these form an almost infinite series of complexes which, in spite of much study, are still imperfectly understood. Here practical experience, no matter how extensive, often needs technical assistance. Greatly improved results in casting quality are possible if full use is made of published material, much of which requires skilled interpretation and application. For example, the proportion of sulphur present in a bronze may be of little consequence, or may be vital, depending upon the presence of other impurities.

Gas porosity, perhaps the commonest of all casting defects in the red brasses and bronzes, is believed to be closely linked with the ratio of hydrogen and oxygen present in the metal. Some of these matters are controversial, still imperfectly understood by the most expert. Each year adds to the store of metallurgical knowledge available to the alert foundryman. The fracture test developed by the American Foundrymen's Society, although still difficult in its practical application, is an important recent contribution.

"can be spoiled in the melting"

One thing has been pretty well settled. The day of miscellaneous scrap as a suitable material for brass foundry use is past, and the same may be said of any extensive use of virgin metals. As a general rule, alloying is no longer a foundry function and had best be left to those who make it a specialty. The secondary smelter, skillfully combining and processing "junk" and new metals, produces composition ingot in a variety of alloys sufficient for most applications and, if needed in quantity, will make almost anything to order. It is only necessary for the foundryman to select a reliable source and make such checks as are necessary to insure that his specifications have been met.

In one important respect the foundryman is responsible for the quality of metal poured into his molds. The best metal in the world can be spoiled in the melting. Melting furnaces are available in a wide veriety of types and sizes; all are capable of producing satisfactory metal if properly operated and supervised. However, each has its own peculiarities which must be understood and provided for if good results are to be obtained. No item of foundry planning is more important than the selection of the right furnace for a given foundry operation and the training and supervision of personnel in its use. Both the cost of castings and their quality are involved. Failure to deal with this factor competently results in lost business and reduced profits.

The brass foundryman knows very well that in the casting of red brasses and tin bronzes pouring temperatures are critical. The correct temperature for a given casting is governed by the nature of the alloy, the quality of the metal, the design of the casting and by the manner in which it is gated. Pyrometers and their use have received much attention at foundry meetings and in the literature. The pros and cons of gating and risering have been widely discussed. As a rule, brass foundry practice has kept pace with developments in this field, but the possibilities of improvement have been by no means exhausted. It is still a field in which experience, based on "cut and try," takes precedence over science.

One might suppose that there is little new to be said about molding sand. For the past half-century no subject connected with the foundry industry has received more thorough study. The properties of available sands are well known; methods for processing and testing have been developed by specialists and are understood by most foundrymen. It is true that the development of so-called synthetic sands (we prefer to say blended sands) has made less progress in the nonferrous field than in other branches of the foundry industry. This is largely because sands suitable for blending nonferrous mixtures are less common and more costly. Under present market conditions the added cost is probably justified; increased use of blended sands in brass and bronze foundries is to be expected.

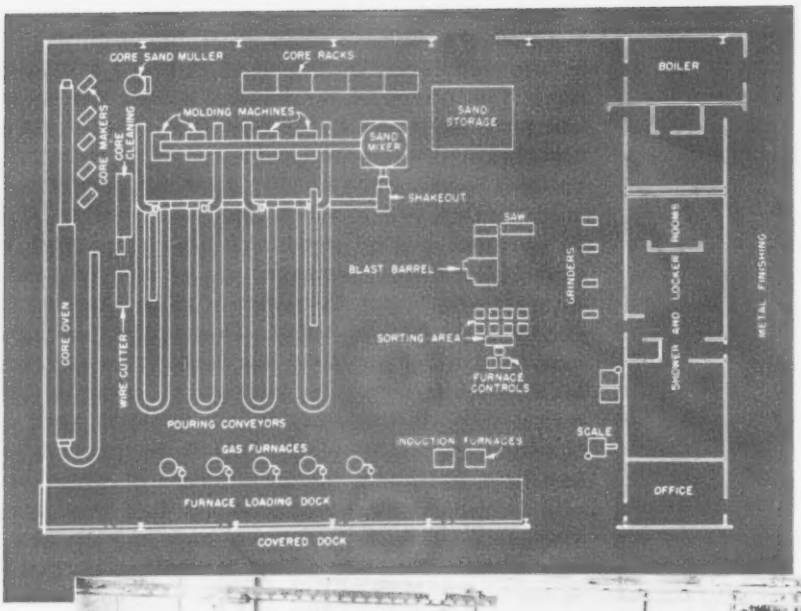
Something New Is Added—Despite the thoroughness with which the field has been explored, there *is* something new. In mechanical handling the magic word is "automation," in molding sand it is "additives." One of the first to be investigated has been soda ash, the possibilities of which are still only partially understood. It does look, however, as if the foundryman will have to learn about pH values. Ethylene glycol is another suggested additive. It appears that there may be no foreseeable limit to the variety of substances which may be added to molding sand to influence its chemical and physical properties. One thing is quite certain: The molding sand of the future will have little resemblance to anything nature has provided for the foundryman's use.

Under the heading of sand, one naturally thinks next of cores. Again we have a tremendous background of research and a highly-developed product which may shortly become obsolete. The new electric methods of baking cores by induction are likely to revolutionize the character of core binders, and again additives will surely be a factor. Common experience has been that cores so made are more uniform, of better quality and less costly.

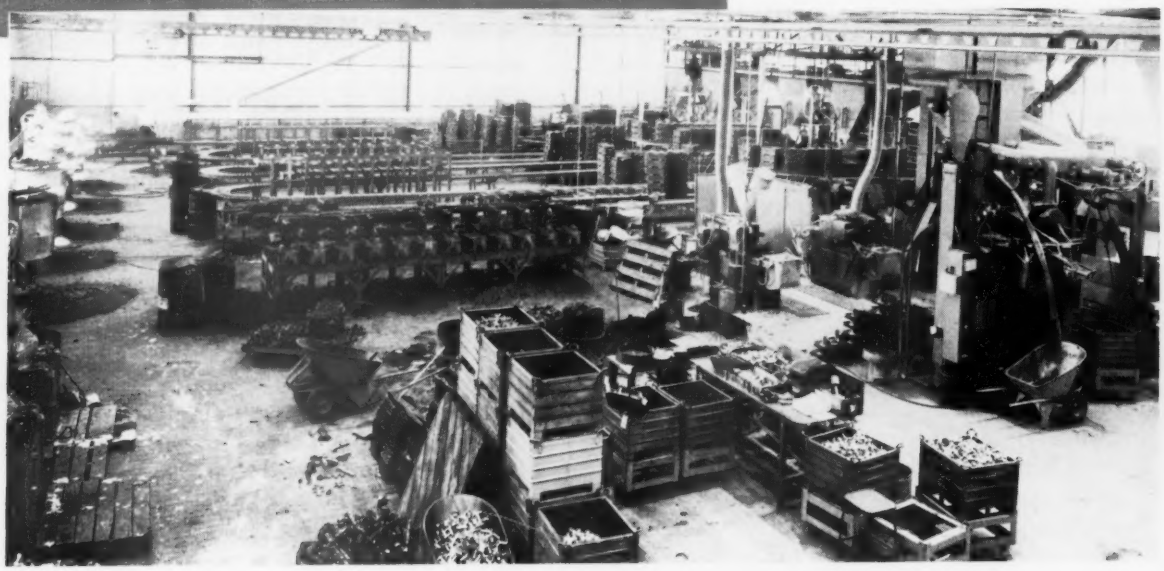
It should not be overlooked that the making of green cores is also becoming increasingly mechanized. More machines, less people. From the present outlook, it may confidently be predicted that throughout the coremaking department, as in the foundry proper, investment costs for equipment will be much higher, operating costs substantially lower than in the past. Although there have been no revolutionary developments in the cleaning department, here too there is a distinct trend toward labor-saving methods.

Looking over the foundry industry as a whole, one fact becomes very impressive. Labor-saving methods mean increased investment in machines and other equipment. Idle machines add greatly to the daily burden of fixed charges and obsolescence. Expensive machines must be kept busy if they are to justify their cost. Peaks and valleys of production mean idle equipment during slack periods. If machines are to pay their way, one of two things must be done. Slack periods must be reduced in number and extent close to the vanishing point, or less expensive standby equipment must be provided to take care of peak periods.

We may safely assume that the competent foundryman will solve his problems of Metal and Sand. His success will then depend upon his ability to work out the most profitable use of Men and Machines.



Floor plan layout and over-all view (below) of new mechanized brass and aluminum foundry of Grayson Controls Division at Long Beach, Calif. It occupies about 16,000 sq ft and produces 10,000 small castings each day



Mechanizing a Small Foundry

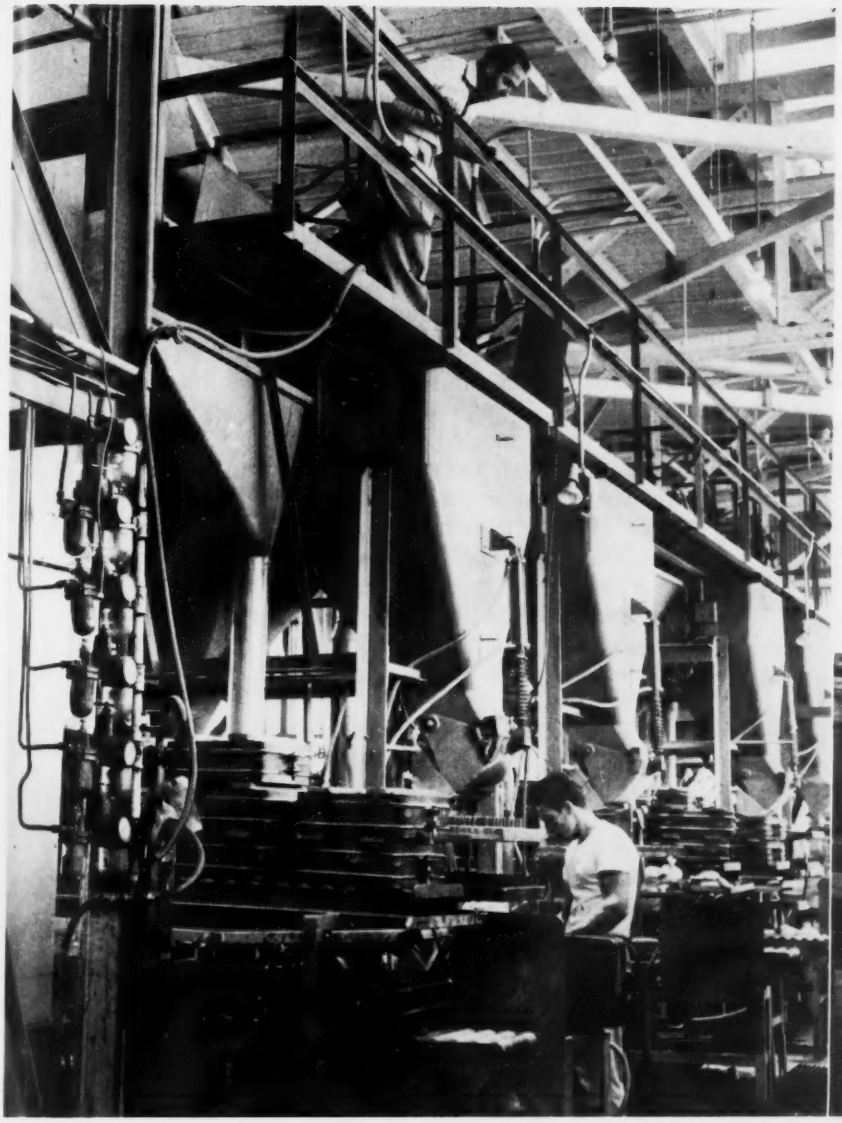
By WILLIAM G. GUDE
Managing Editor

A FOUNDRY need not be large to benefit from mechanization, particularly if it is a captive shop handling highly repetitive work. This is aptly demonstrated by the new nonferrous foundry of the Grayson Controls Division of Robertshaw Fulton Controls Co.

Grayson makes a precision product. It is said to be the world's largest producer of automatic controls for water heaters, and is a major manufacturer of other thermostatic controls and automatic ignition devices. Among the many small parts that are assembled into these products are numerous brass and aluminum castings.

The firm needed only a one-car garage for its operations 27 years ago when it was founded in Lynwood, Calif. Its growth has been rapid since then, and recently it completed at Long Beach, Calif., a bright new plant that provides 237,000 square feet of floor space and employment for about a thousand people. The foundry, occupying only 16,000 square feet and having only about 35 employees, represents a small though highly essential part of the total operations.

Modern design marks the new plant, including the foundry. Efficient lighting maintains 65 footcandles at floor levels, and overhead windows are tinted to keep out glare. A ventilation system provides a complete air change every 5½ minutes. Effective use is made of color on walls, ceiling and equipment to provide pleasing surroundings



Left—View of the jolt-squeeze molding stations. Sand is received from overhead hoppers fed by belt conveyor

Below—Cores are blown at five stations and baked in a continuous oven

which contribute to the comfort of the workers.

General layout of the foundry is shown in the accompanying sketch. Melting furnaces are located along one side of the foundry area, and molding machines are on the opposite side. Melting equipment, arranged in line, with a charging platform extending in back of it, consists of five gas-fired crucible furnaces and two electric induction furnaces. The former, for melting brass, includes three of 225-lb capacity and two of 400 lb. The induction units, used to melt aluminum, are each of 650-lb capacity.

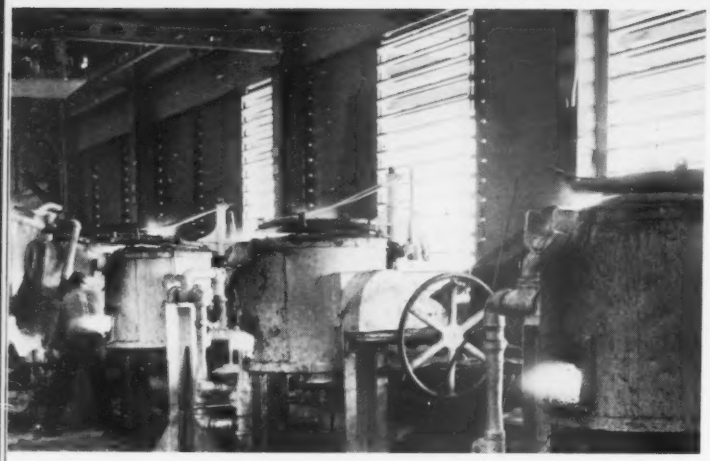
Each day the foundry melts about 18,000 pounds of metal in the production of approximately 10,000 castings. Four-fifths of the output is brass, the balance aluminum. Obviously, most of the castings are small; the largest weighs 4 lb.

In addition to pouring castings in sand molds, the company is just completing installation of a die casting department in a room off the foundry proper. Two machines will be used in die casting various aluminum and zinc parts.

Layout of the foundry, plus an efficient setup for handling materials, permit castings to flow steadily from pouring lines through the cleaning department. The sand handling system is mechanized, and a continuous core baking oven is employed.

Floor space between the melting department and sand molding stations is occupied largely by four roller conveyor loops on which molds are set out for pouring. Molding equipment consists of eight jolt-squeeze machines located back to back in two rows of four units each. Each machine is provided with a sand hopper that is supplied by an overhead conveyor belt leading from the central sand preparation unit. The latter is located to the left of the line of machines.

Molds are made in tight flasks and pushed out over a roller conveyor adjoining each machine. Empty flasks and bottom boards also are returned to the machine operators after shakeout over roller conveyors. Molds are poured on the outgoing sections of the conveyor loops. Three of the four loops are equipped with a simple but effective mold weight device. It consists of a frame holding flat weights to accommodate 11 molds. These weights, which are moved vertically by air



Some of the five gas-fired crucible furnaces for melting brass. Two induction units melt aluminum

cylinders, are lowered by gravity onto the molds; after the molds are poured the weights are raised with the turn of an air valve.

Poured molds are moved to dumping stations at the end of the return sections of the four conveyor loops. There an operator actuates an air valve with his knee, and an arm flops the mold onto a cross-traveling conveyor belt. This belt carries castings and sand to a floor grating through which the sand drops. A small power-driven pulley rotating near the face of the conveyor's head pulley helps to break up sand lumps. An operator picks off the castings as they drop from the conveyor, knocks off adhering sand and stacks them on a skid.

The board located in a frame above the pulley, as seen in the accompanying illustration, is used to count the number of castings coming off the conveyor. Samples of the castings are mounted on the board, and alongside each is a counting device.

Molding sand, a western natural bonded type, is carried by bucket elevator from below the floor to the overhead sand preparation system. The latter includes storage bin, aerator and 1500-lb capacity mixer.

The stacked castings are moved to a nearby bandsaw where gates and sprue are cut off. They are then put through an airless blast cleaning barrel and subsequently transported to a row of four stand grinders for finishing. Cleaned castings are loaded in tote boxes for delivery to the machining department.

Molding operations require a considerable number of small cores. The coremaking area includes five blowers arranged in line alongside a belt conveyor that leads to a continuous baking oven. The blowers are operated by women. Baked cores are placed in trays and delivered to the molding stations.

Hot metal is handled between the furnaces and pouring stations by a bridge crane and hoist which traverse the area.

Castings picked off the shakeout belt conveyor are stacked for delivery to cleaning department

Two of four stand grinders used to finish castings after a blast cleaning operation

HUGE CASTINGS

Required for Heavy Forging Presses

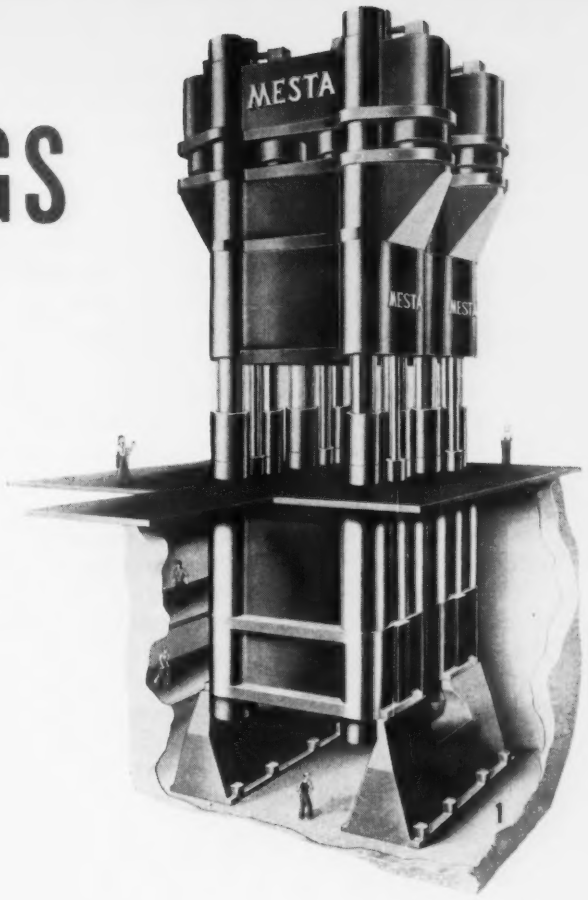


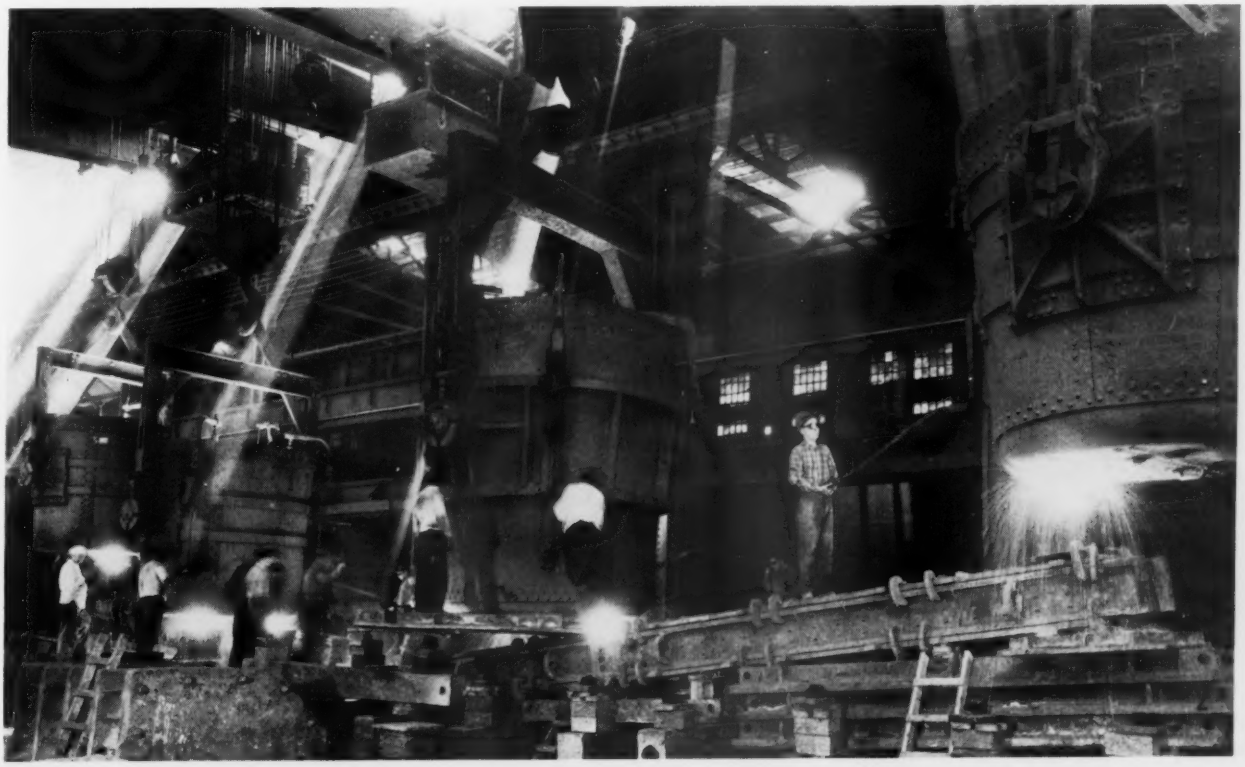
Fig. 1—Sketch of the 50,000-ton forging press

IT TAKES huge castings to make possible the production of large aluminum forgings. This is apparent in the equipment installed in the $40 million plant completed recently at Cleveland as part of the heavy press program of the United States Air Force. Aluminum Co. of America was general contractor in the building of the plant, and Alcoa now is operating it under a lease arrangement with the Air Force.

The plant houses two of the world's largest hydraulic forging presses—a 50,000-ton unit built by the Mesta Machine Co., Pittsburgh, and a 35,000-ton press built by the United Engineering & Foundry Co., Pittsburgh. These capacities are expressed in forging pressure; actual weights of the units are 7164 and 6244 tons, respectively.

From the standpoint of castings required in their construction, the two mammoth presses are the most interesting among the many and varied types of large equipment employed in the operation

Fig. 2—A moving crosshead section of the press is poured by four big ladles working in tandem



of the plant. The 50,000-ton unit is 87 ft high, extending 36 ft below ground level and 51 ft above. Sixteen huge steel castings poured in the Mesta foundries at West Homestead, Pa., comprise the major sections. Over 350 tons of steel was required to pour some of the largest individual castings. Eight other castings weighed from 215 to 240 tons each. Equipment used to machine the press sections included a Mesta 18-in. horizontal boring and milling machine that was designed and built especially for the job.

From the subterranean foundation, two cast steel "stools" carry the press proper. Mounted on these are two lower base and two upper base sections which weigh more than 800 tons. One of the accompanying illustrations shows the pattern for a footstool base. Another view shows the mold, with cores in place, in which a base was cast.

The movable die table, on platen, which holds the lower forging die, is attached to the base sections. The die table, 12 x 26 ft, is withdrawn only when the forging dies are changed. Forged parts are removed and ingots inserted between the dies by a manipulator which moves on rails. Maximum press stroke is 6 ft, the working stroke 2 ft, and the machine is designed to operate at 30 cycles per hour.

Above the movable die table is 15 ft of daylight —the opening between the jaws of the monster vise. The upper die is clamped to the upper platen, which is attached to the lower moving crosshead.

The entire moving crosshead assembly—the upper jaw of the "vise"—consists of eight steel castings weighing more than 1100 tons. Above this assembly are the stationary crossheads, which house the eight main hydraulic-pressure cylinders. Accompanying views show the pattern for a stationary crosshead; also one of the patterns while in a pit mold.

Running through the press, from top to bottom, are eight forged alloy steel columns, 40 in. in diameter and 76 ft long. Forging ingots weighing as much as 270 tons each were poured by teaming three immense ladles of molten steel in the Mesta foundries. After forging, each column was heat treated in a special furnace 112 ft long.

The press force is generated by the hydro-pneumatic pressure system. It consists of four prefiller bottles, two horizontal reciprocating pumps driven by 1500-hp motors and four forged alloy steel pressure accumulator bottles. The hydraulic fluid is water, with a small percentage of soluble oil to keep the system rustfree and lubricated. A pressure of 4500 psi is built up in each accumulator and released to the eight pressure cylinders housed in the stationary crossheads at the top of the press. Combined effort of these cylinders produces 50,000 tons of forging capacity.

These two large presses mean production of larger and more precise forgings than was ever possible before. Size of the forgings will permit one-piece construction of airframe parts which formerly required several pieces. The parts will be stronger and lighter, and the precision obtainable will reduce the amount of expensive machining required on them.

Fig. 3—The pattern for a stationary crosshead

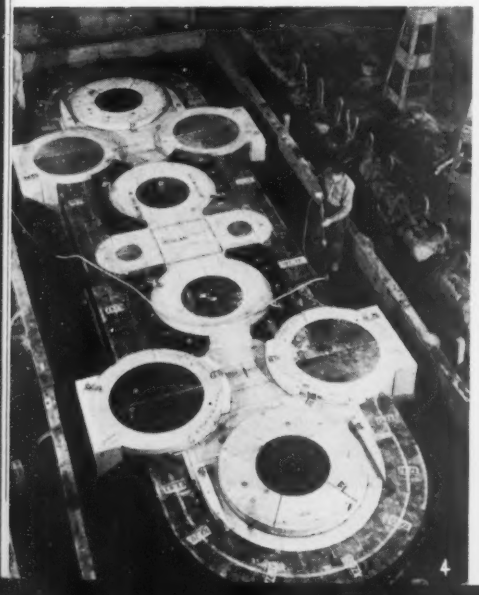


Fig. 4—Here, the stationary crosshead pattern is shown as it appeared in the steel foundry

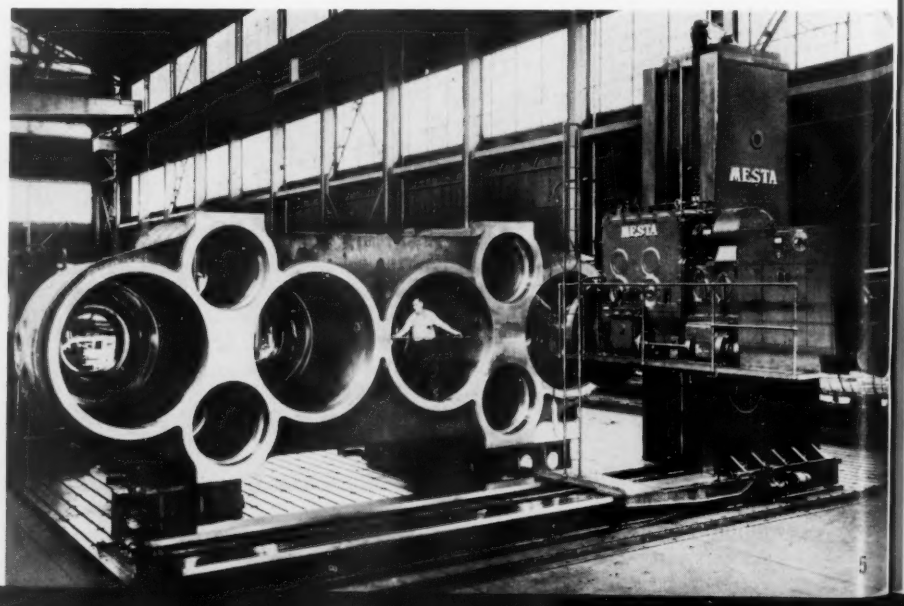


Fig. 5—Machining a stationary crosshead casting. Note size of the man shown in the view

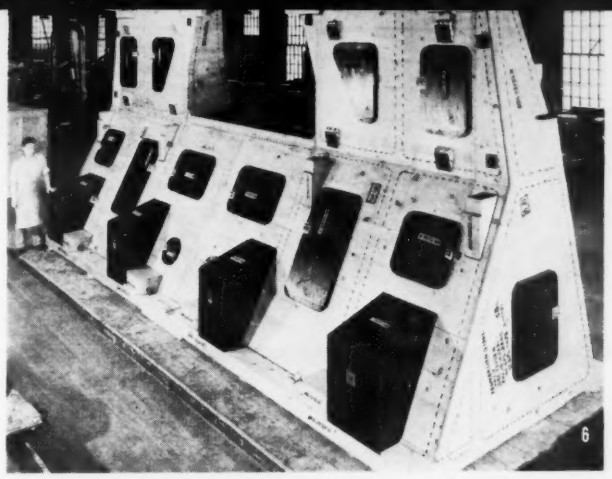


Fig. 6—The pattern for a press footstool base

Fig. 7—A view of the mold for the press footstool base as it appeared in the steel foundry

Fig. 8—The 35,000-ton press is shown in the foreground and the 50,000-ton press in background

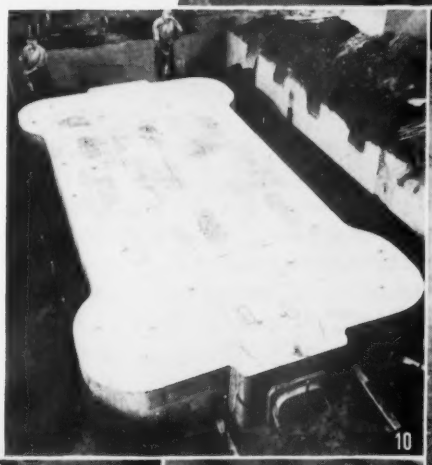
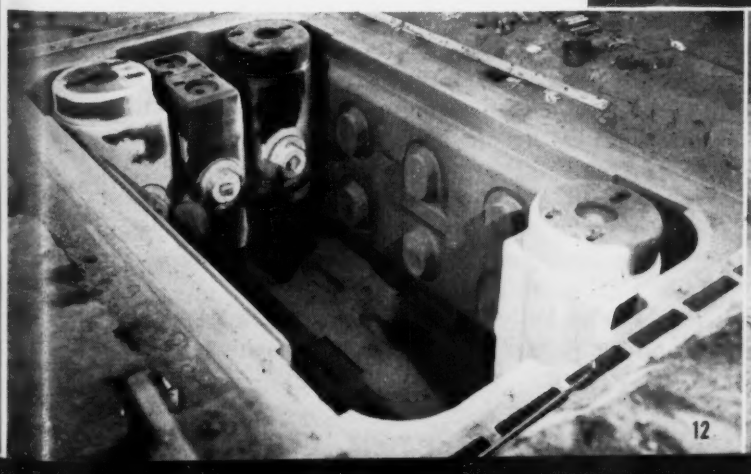


Fig. 9—Pattern for press base section. Fig. 10—The press base pattern in foundry. Fig. 11—Pit mold for one of the castings. Figs. 12 and 13—Pit mold for a casting with cores partially and completely in place in the mold



So You Are Going To Try

In a previous article, the author considered the theoretical aspects of shell molding. This paper goes on to treat the practical problems confronting any foundries which are about to get into shell molding

THE DECISION to begin a shell molding operation is a big one. Theoretical aspects of the problem have been covered previously (FOUNDRY, June, 1955), but the practical considerations require further treatment.

The first question is, "What do I need to start? What is involved in getting into production?"

To get started in shell molding, you must have these facilities:

1. A well made pattern, properly seasoned.
2. Shell molding sand and the proper shell resin.
3. A machine designed to produce shells of the size and depth you will require.
4. A surface pyrometer.
5. A device for assembling shells into molds.
6. A suitable adhesive for assembling shells.
7. A device for blending or mixing resin and sand.
8. Sufficient area to operate a shell department—about 30 x 50 ft.
9. Full-time attention of a technically trained man plus a full-time operator.

Getting started properly obviously requires quite an initial outlay of cash.

It is strongly suggested that several foundries not in direct competition band together in this project. Perhaps a brass, a gray iron and a steel shop can combine limited financial resources and all gain the desired results from the program. Patterns should be owned individually and cost of the rest of the equipment prorated. Shells may be transported easily to the parent foundries for pour-off. This arrangement permits operation without the purchase of further melting equipment.

If this group method is not feasible, the small foundryman must, of course, underwrite the entire cost alone. If this is the case, it sometimes is possible to find a customer who is willing to help to a degree in financing such a program in order to reduce over-all finishing costs or to improve casting finish.

The Shell Making Machine—The first problem involves the purchase or construction of a suitable machine to produce shells. Many acceptable machines are on the market. Shell machines have graduated for the most part into the automatic and semiautomatic production machine classes. A hand-operated machine will not keep you competitive today. The average shell machine is just as complex as a jolt-squeeze molding machine or automatic coreblower. If it is your policy to construct this type of equipment in your plant, your logical solution is to build your own shell molding machine. Otherwise a well built, tested, guaranteed automatic or semiautomatic commercial machine is your best bet.

Be sure to obtain a machine suitable to do the general class of work which you intend to run. For example, don't buy a machine with an oven 10 in. high to make shells 9 in. deep. You will burn the top before you cure the rest of the shell. A 10-in. oven would be fine for work 3 or 4 in. deep, and a 30-in. oven would be unnecessary.

Gas or electric heat works equally well. Either is available in commercial equipment. Since a great many Btu must be used to produce shells, it might be wise to compare electricity and gas rates at your plant. If you melt with gas furnaces, you probably are purchasing gas at a low rate. If natural gas is not plentiful in your area or you are using little or no gas at present, use electricity.

The important thing to remember is that regardless of whether you use gas, electricity or both, you must have control of the temperature of the pattern and the oven at all times. There must be some method of changing the temperature of either without affecting the other.

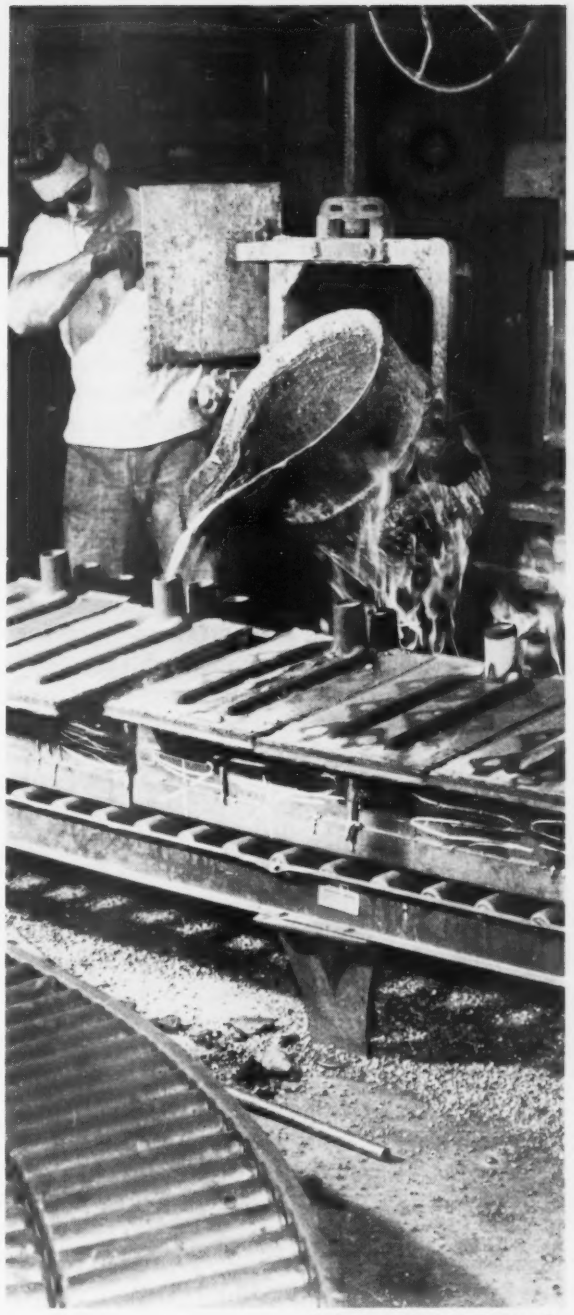
Uniform Heating Important—It is very important that the pattern plate be heated evenly. The difference between the hottest and coolest portions of the pattern should not be over 40° F. This may be accomplished by a gas flame impinging on the back of the pattern and by electric heating elements and cartridge heaters on and in the pattern plate. It also is possible to operate by picking up sufficient heat in the curing oven to replace any heat lost during the previous investment cycle.

Unevenly heated patterns cause warped and weak shells. A surface pyrometer is best suited to check temperatures. Crayons which melt at certain temperatures will give a rough approximation of the heat condition.

You should decide upon a machine in the beginning, because different types of machines require

Shell Molding?

By JOHN G. STEINEBACH
Foundry Engineer



Production Pattern & Foundry Co.

Most shell molds are poured horizontally. The nature of some castings requires vertical pour

different-sized patterns and different heating arrangements.

Much controversy has arisen about what constitutes a good shell mold pattern. The author is no patternmaker, but past experience has shown that a minimum of difficulty has arisen by watching these points:

1. Have your equipment made by a reputable patternmaker who has had considerable shell pattern experience. These men have gone through considerable grief to obtain this experience, and they stand ready to aid you in getting good workable equipment at a reasonable cost. Don't be a guinea pig for a patternmaker without shell experience.

2. The pattern or patterns should be machined completely and mounted on an accurate, flat plate. The edge of the plate should have a sand strip to keep the shell from adhering to the sides of the dump-box or frame. All gates and risers should be mounted separately on the plate to permit changes if necessary.

3. Allow enough space between patterns to accommodate the adhesive material used to assemble the shells into mold. Do not try to crowd too many impressions onto one small plate.

4. Patterns can be made of just about any metal. Aluminum makes the cheapest pattern and works fairly well for a limited quantity of castings, but brass or iron plates last much longer without losing dimensional tolerances. Aluminum is difficult to maintain at an even temperature.

5. The patternmaker must realize that metal poured into a shell yields a slightly denser casting than metal poured in green sand. Shrinkage allowances for shell pattern work therefore differ from those required for conventional jobs. The pattern will be used hot and expanded, and that fact also must be taken into consideration when the patterns are made.

Selecting the Sand—Sand used for shell molding should be a locally available, clean, dry, silica sand. Silt, clay and other impurities weaken the shells. Most sand companies have special sands for shell molding. Keep in mind that the more silt or clay in a bank sand, or the finer the sand, the more resin is required to produce a usable shell. Pick the most economical sand for the type of finish desired, and, after the representative of the sand company has demonstrated how to produce strong economical shells with his sand at a 4 per cent resin level, stick with the one you have chosen. In this manner one of the usual variables can be eliminated. Sand will vary slightly from shipment to shipment, but it should not differ enough to cause trouble.

The resin used for making shells may be purchased from any of numerous chemical companies. Each company has several types of resin formulated for different applications. The local sales and service representative can tell you which resin is best suited for your particular setup. You should ascertain that the resin is a "neat resin"—that is, all resin, without fillers or other extraneous ma-

terials which serve to reduce the price.

Since the average small or medium-sized foundry has no room to store large quantities of resin indoors in a cool, dry place, facilities to ship fresh material from a nearby warehouse on short notice are important. The resin cannot be stored near furnaces or ovens or in the direct rays of the summer sun. Moisture will cause the material to become unusable quite rapidly.

After you have chosen the resin and the sales representative has demonstrated how to produce flat, strong shells at the desired cycle speed on your machine, stick with that resin until you are in production and have time and methods available to run tests on resins. Resin from reputable companies will not vary enough from batch to batch to cause any difficulty.

Blending the Mixture—Sand and resin must be blended before use. If you have a conventional sand muller and are willing to clean it before mixing shell sand, it can be used. A cover must be made to keep the dust down. Dust from dry sand and powdered resin becomes a problem.

A wetting agent is desirable to reduce dusting; unfortunately, it weakens the shell. Usually about 2 oz of kerosene to 100 lb of sand is introduced into the sand and mixed for several minutes before the resin is added. An excess of kerosene or other moisture causes black smoke and a general weakening of the shell. If dust is not a problem, do not use any wetting agent. Several chemical-type blenders are available to mix dry ingredients with minimum dusting, and they work well.

The amount of resin used varies from 4 to 7 per cent of the weight of sand. Start at about 6 per cent and after you get good castings, slowly reduce the resin content by ¼ per cent increments until excessive cracking of shells occurs.

If you get excessive breaking out of metal at the 6 per cent level, chances are that your shells are not straight before assembly and that you are pre-stressing them during assembly. Under these conditions, thermal shock causes them to crack. Short-flow fast resins seem to tend toward easy cracking. Long-flow slow resins are strong, but tend to "peel back" or "drop off" during the investment of the shell.

Assembling the Shells—A suitable device is necessary to assemble shells into completed molds, and several commercial varieties are available. It also is possible to build your own. A good bit of trouble can be avoided from the start if the shells are fastened together properly.

Fence staples, clips, nuts and bolts, etc., are satisfactory only on very small shells. With shells of any appreciable size, an adhesive should be introduced onto the hot shell face at various spots—both in the central section of the shell and around the edge. Finning will be reduced to a minimum if the shells are glued around each mold cavity.

The usual method of assembly is to place the hot shell under a template, with holes (about $\frac{1}{16}$-in. diam) drilled at the locations the adhesive is applied. Powdered resin especially formulated for this purpose is vibrated through the holes onto the hot shell. The resin box and template are removed, and the half-mold is positioned and aligned with the first.

Pressure is applied, either by a rubber diaphragm or by spring-loaded fingers, to both halves of the mold. In approximately 20 to 30 seconds, the mold is assembled rigidly and is ready for pouring. A template showing the locations of the movable spring-loaded fingers for each pattern plate is made and kept with the drilled template for distribution of resin on the hot shell.

Production Pattern & Foundry Co.

Shell patterns are expensive, precision equipment. They should be stored properly, as shown

The resin used in this operation will cause a casting blow if it drops into a mold cavity. For this reason sufficient room is necessary between cavities to allow the resin to form a small core.

About ½ to 1 in. should be allowed between hot shell and drilled template because heat from the shells will slowly heat the template and the resin supply if the template is too close. This condition makes the resin set up partially and become lumpy. It then will not flow through the template. If the template is raised too high off the shell, the resin spreads too much and falls into the mold cavities.

"Seasoning" the Pattern—The pattern must be well "seasoned" before a shell can be made. This is done by heating the pattern and plate to about 300° F and wiping a thin coating of silicone jelly on all surfaces. The pattern is returned to the oven and kept up to temperature for about 2 hr. It then is removed, recoated and returned to the oven. This process is continued for approximately 8 hr, after which the pattern should be well seasoned. Next, spray the pattern with a fine, atomized silicone liquid solution, and you are ready to make a shell.

You must watch your patterns to make sure that too much silicone is not used during the production of shells. It should be possible to make eight to ten good, easily stripped shells from one spraying

of silicone release agent after the pattern has been seasoned and run a short while. It may be necessary to spray after every two or three shells when use of a new pattern is started.

Most silicone release agents have a tendency over a period of time to "build up" or make fillets in sharp corners and to cause some pattern detail to be lost. Periodic cleaning by blasting with crushed corn husks, rice hulls, etc., will remove the silicone buildup without injuring the pattern surface. After cleaning, the pattern must be reseasoned before it is returned to production.

If your pattern plate has an excessive number of long projections such as valve stems, etc., some difficulty may be encountered in getting the shells to strip. This problem can be overcome by removing all but one or two of the projections and making a shell. If the pattern is mounted perpendicular to the plate, there should be no stripping problem. Then the remaining patterns can be added to the plate one or two at a time until the pattern is reassembled. This method immediately will show any backdrafted patterns or bent projections.

Sand and resin must be mixed thoroughly before use. If the shells show black bubbles on the back, the resin is not dispersed evenly through the sand.

Keep Temperature Constant—The pattern should be heated to between 400 and 550° F. When the desired temperature for the time cycle you require has been determined, keep the pattern at the same temperature at all times you are operating. The oven should be at 800° to 1000° F. The exact oven temperature is determined by the particular resin you are using. If shells stripped from the pattern have a convex curve, oven temperature is too high. Concave shells mean that the temperature is too low. Some resins tend toward a rubbery condition when stripped. These shells will pull into line on the core bonding machine under pressure if placed there before cooling.

The shell is cured when the back becomes hard. A sharp tool scraped across the back should leave a single scratch-line. An undercured shell will tend to ball up behind the tool. Color is not a good indicator since a dark bank sand yields a dark brown shell and a white silica sand yields a yellow shell. Additives such as iron oxide, chrome oxide, etc. give a red or a green tint to shells. Much work has been done with various additives, but they are not to be recommended for normal shell work. They weaken the shells and do not give the benefits sought.

Anyone who has got into shell molding has had free advice offered from many quarters on gating the castings. Common sense and previous green sand practice are the best rules of thumb. Try to keep turbulence to a minimum. A sharp reduction of cross-sectional area from that used in green sand practice will help.

One Way To Do It—The scientific approach to gating is to leave the gates off the pattern plate entirely. With a handful of sand-resin mix, form a mound on the back of the uncured shell where you think the gate should go, and cure the shell in your oven. File a gating system into the face of the shell, clip a piece of clear glass against the face and pour soapy water down the sprue. The soap suds will show the points of turbulence in the mold. Make another shell and change your filed gates to correct what you saw previously. Continue this procedure until a good flow is observed. Remember that water is more fluid than molten metal and becomes turbulent more easily. When the best gates have been established, cast a set, polish them and mount them rigidly on the pattern plate.

The most success in pouring generally has been obtained by placing the mold horizontally. Some castings by the nature of their design must be poured vertically. There is no reason why this method can't be used, but the farther down in the mold the metal flows, the more tendency there is for "burn-in," which causes a rough casting surface. Vertical pouring will cause this trouble more than horizontal pouring. Vertically poured shells usually must be backed up with shot, gravel or sand. This is to be avoided if possible, for back-up material is extremely expensive to handle and clean. With horizontally poured shells, the drag may be bedded in loose sand and the cope merely weighted. Surprisingly large castings are being poured in this manner.

Although it is economically sound to use as large a pattern plate and mount as many patterns as possible, mechanically it is poor practice. Criss-cross your pattern plate with knife strips and break the large shell into smaller molds. For example, a 20 x 30 in. shell could be broken into six 10 x 10-in. shells—three copes and three drags. This step is taken prior to assembly. The reason for this operation is that the larger the shell, the more difference a few degrees of warpage mean. A 10 x 10-in. shell quite badly warped can be assembled without too much strain. A 20 x 30-in. shell with even a slight warp will have to be forced together at the corners, creating bad stresses which probably will crack during pour-off and cause a runout. Of course, the physical dimensions of the casting dictate the dimensions of the shells.

Watch the Metal—One of the most important aspects of shell molding is the metal. What is good enough for green sand is not necessarily good enough for shell molding. The slightest amount of gas or other impurity in the metal will show up much more readily on a smooth shell casting than on a normal green sand casting. Be sure metal is completely degassed and properly fluxed before pouring, particularly with nonferrous. Metal temperatures generally can be reduced somewhat from those used in green sand practice.

In general, use good equipment and materials, good metallurgical practices, common sense and the knowledge offered to you by the machine, resin and sand salesmen. Above all, figure a delivery date six to eight weeks after you receive patterns on that first job, and you still may have to work a few nights to make it.

A New Role for PATTERN SHOPS

By AL BROCKLEBANK
Pattern Manager

and

WILLIAM J. SIKULA
Assistant Pattern Manager
Wellman Bronze & Aluminum Co.
Cleveland

IN THIS day of high-speed, volume production, a pattern shop must assume responsibilities beyond the traditional construction of patterns to blueprint specifications. Today's pattern shops must act as a potential trouble shooter.

World War II showed manufacturers that changing designs in mid-stream was not only feasible but economical. Since the end of the war frequent and rapid design changes have become routine. New products are entering the market at an unprecedented rate, and old products are being constantly revamped.

Time has become and is becoming more and more important. Automated production lines gobble up castings at a fantastic rate. The time lapse between the drawing board and the molding floor has shrunk beyond all belief. These changes in manufacturing techniques and tempo have thrown the pattern shop into the position of becoming a trouble shooter or, more properly, a trouble avoider.

At Wellman pattern jobs for both ferrous and nonferrous castings are handled. Work is done not only for our own foundry, but for foundries and manufacturers throughout Ohio and surrounding states. Experience with concerns and people involved in all phases of casting design and manufacture has lead to one conclusion. For a job to be done properly, pattern shops must act not only as patternmakers, but also must serve as design consultants on foundry techniques. Each design must be analyzed to eliminate production bugs and to streamline it productionwise, before one drop of metal is poured. Any good design engineer will know, generally, what designs are feasible for casting. But unless he has had extensive foundry experience, or is in constant contact with a foundry, he cannot be expected to know all of the problems and techniques of casting. That's where the pattern shop can really earn its keep.

When a new job comes into the shop it must be studied carefully. Pitfalls in the design must be eliminated, the best arrangement of patterns—an arrangement that will require minimum work in the foundry—must be determined. If a change in the design of the casting will simplify the foundry's job, there should be no hesitation about asking the customer to make the change.

An example of how a pattern shop should help design engineers is shown in Fig. 1. This is an aluminum casting for a superchanger cast by Wellman's Superior plant. The original blueprints called for wall *A* to be an integral part of the casting. Area *B* was specified to be completely free of any irregularities or flashings. It was evident that there was no exit for gases formed during the casting except down through the cores. In addition, there was no adequate way to support the cores; it was impossible to make one core for area *B*, so two cores were required, leaving an inaccessible flashing at point *C*.

Obviously this design would not be practical from the foundry's standpoint. Design inconsistencies were brought to the customer's attention and sev-

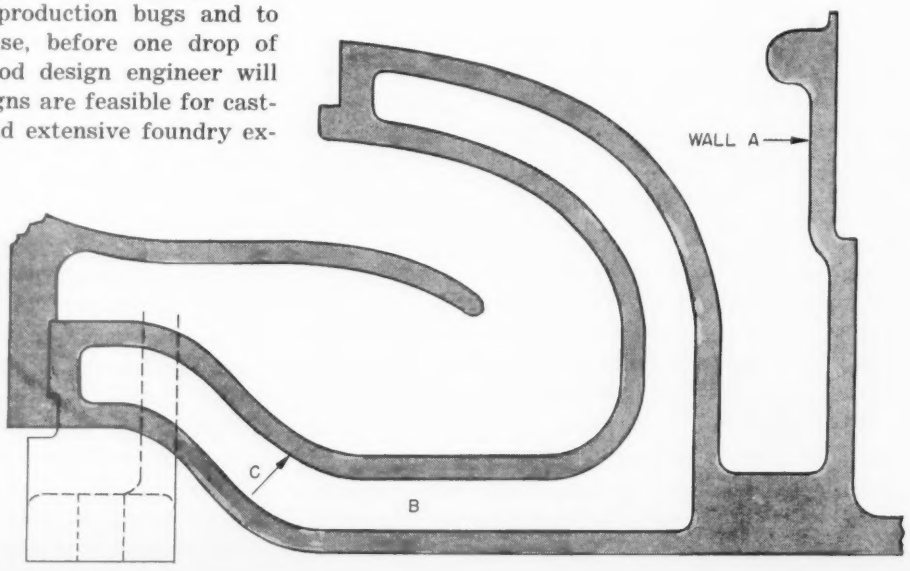


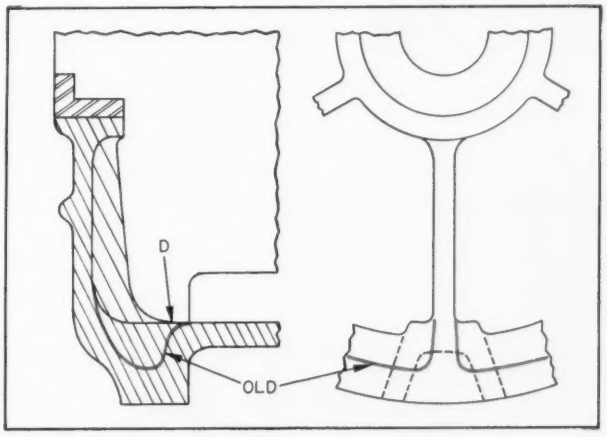
Fig. 1—In original blueprints of this aluminum casting for a supercharger, wall *A* was specified to be an integral part of the casting, and Area *B* was to be completely free of any irregularities or flashings. This design was not practical from the standpoint of the foundry

eral changes suggested. The main suggestion was to eliminate wall *A* from the casting, and replace it with a removable plate. It was explained that by doing this the foundry could provide ample support to the cores, gases would have an easy passage for escape, and the ridge at point *C* could be reached for cleaning.

This, of course, was an obvious solution to an obvious problem, but many times the problems are so hidden they may seem not to exist. The job shown in Fig. 2 was completely workable; in fact, it was in production when our foundry got the contract and sent the existing coreboxes to us for repairs. This magnesium casting is not too complicated, but might be simplified farther by combining the existing 13 cores. Are the six little reinforcing fins, shown at *D*, important enough to justify the time and work involved in making and pasting a core for each one? Suggestion was made to the customer that the whole section be brought up to the height of the fin and squared off. The results of this conference are pretty evident in the before and after pictures, Fig. 3.

The point of these two examples is not what was done, but rather that something was done. In either instance the job could have been run as originally specified, but the results would not have been satisfactory. As was noted previously, this design analysis problem is more acute now because of the upheaval in manufacturing methods that has occurred in the past decade. Pattern shops must recognize the scope of this problem and accept the responsibility of coping with it.

There is a definite gap that must be filled between the designer and the foundry. If pattern shops do not fill this gap and accept the responsibility of preproduction design analysis, who will?



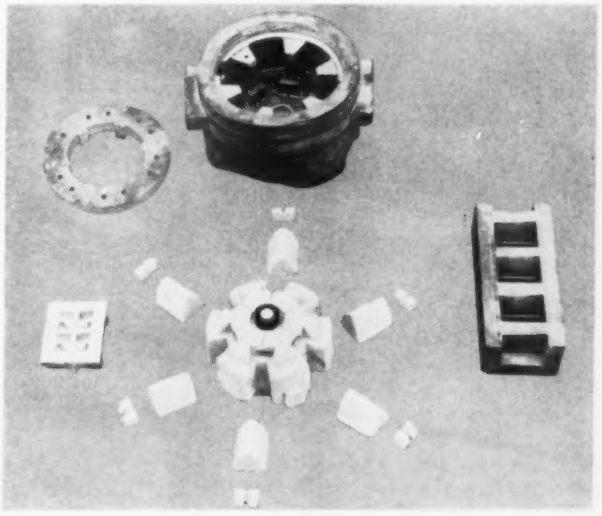
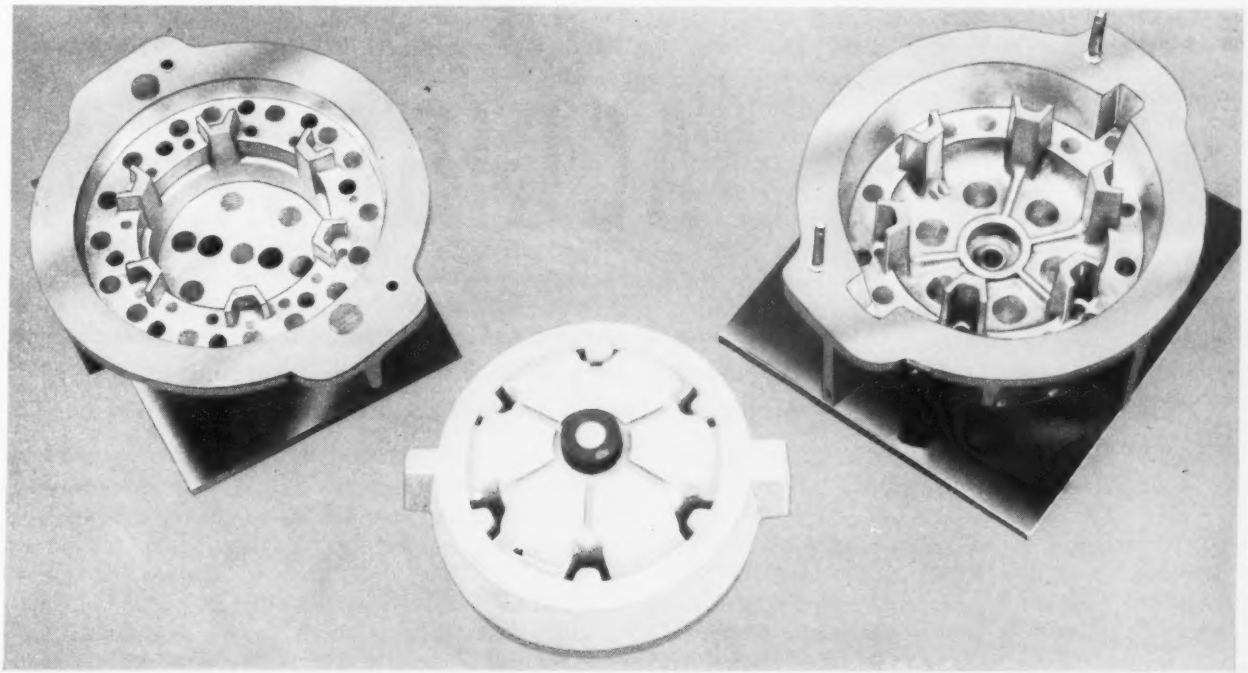


Fig. 2 (above)—The magnesium casting shown in this illustration was completely workable, but further simplification was possible. Fig. 3—Before and after views of this casting appear at right and below, respectively. Thirteen existing cores were combined, and the section was squared off where 6 reinforcing cores had been



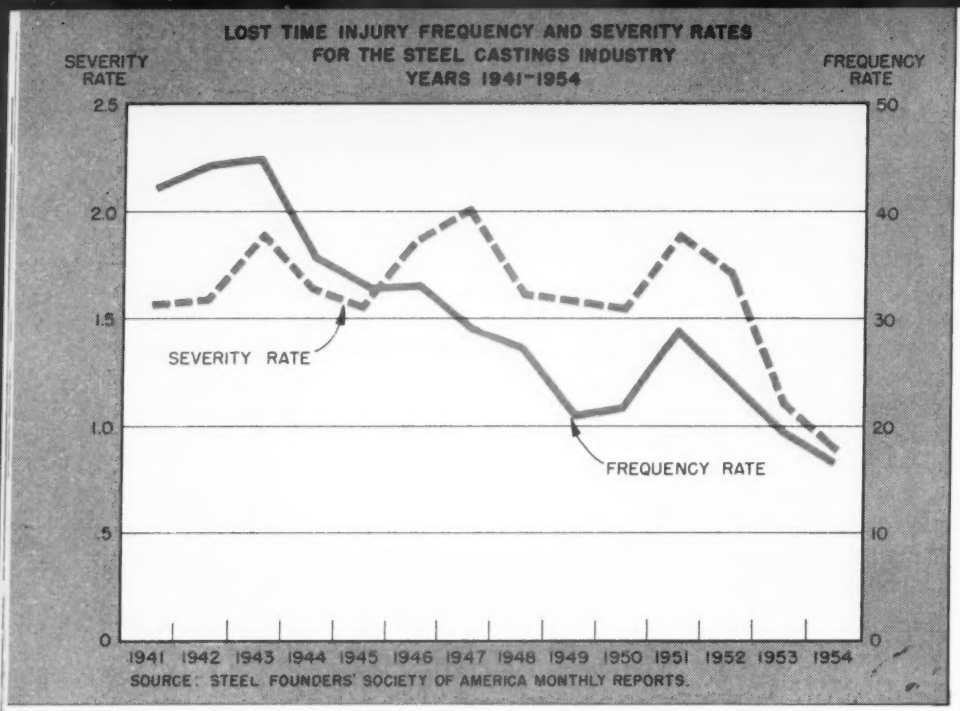
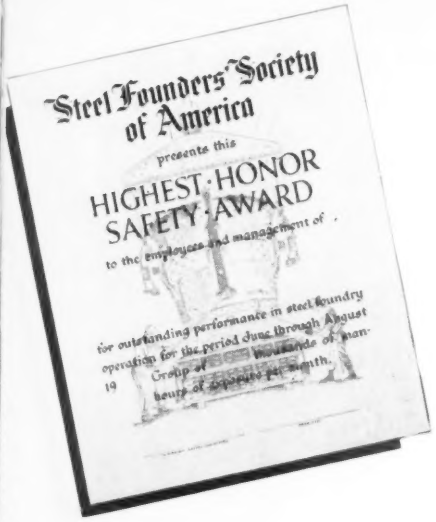
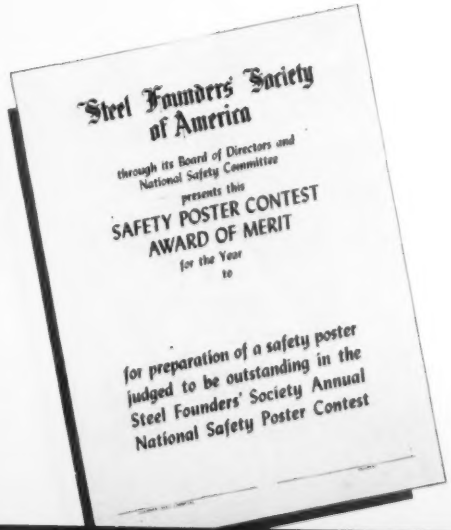


Fig. 1—Chart shows how frequency and severity rates of SFSA members fell during the period from 1941, when the program started, to 1954


Steel Founders' Society of America
presents this
HIGHEST HONOR SAFETY AWARD
to the employees and management of
for outstanding performance in steel foundry operation for the period June through August 19
Group of thousands of man-hours of exposure per month.

Figs. 2 and 3—In 1954, 47 of 151 competing foundries had a frequency rate of 0 and won the award which is shown above. The four winners of the poster contest won the award shown below


Steel Founders' Society of America
through its Board of Directors and National Safety Committee
presents this
SAFETY POSTER CONTEST
AWARD OF MERIT
for the Year
to
for preparation of a safety poster judged to be outstanding in the Steel Founders' Society Annual National Safety Poster Contest

Steel Founders Prove that

SAFETY IS NO ACCIDENT

Achievements of the Steel Founders' Society of America during the 15 years since it instituted its organized safety program in 1941 prove that application can produce results

By JACK C. MISKE
Assistant Editor

ACCIDENTS are like sin: Everybody's against them. They're also like the weather in that everybody talks about them, but they're unlike it in that some people *are* doing something about them. In this instance, the people are the individuals who compose the member foundries of the Steel Founders' Society of America and its staff.

Existence of the society itself goes back to 1902, but its accident prevention program got under way in 1941. At that time, a safety committee was set up, and the first society safety statistics were collected. Since then many varied activities have been undertaken as part of the total program. Efficacy of the program was demonstrated last year when the National Safety Council cited the group for its outstanding work in the promotion of safety. The award was particularly notable because no other metalworking association was cited and because the SFSA was in its first year of membership in the council.

More Than Statistics—More important than awards, however, is what the record means in terms of benefits that can't be explained merely by accident frequency and severity rate statistics. These benefits extend to at least three separate areas: The individuals who have been saved injury or death; the steel foundries, which have been saved expense and lost production; and the foundry industry itself, which has been shown in a better light than that in which if often has appeared before. What remains is for the entire industry to follow the example it has been given. Here's the story of what the steel founders did.

In 1941, at the start of the program, the accident frequency rate for members of the society was over 40, and it stayed there until 1943. Since then, the trend has been steadily downward. In 1954, it was 16.2, well under half the figure in the year the first SFSA Safety Committee was formed. In the same period, the severity rate fell from 1.57 to 0.89. Fig. 1 shows how the rates went down.

It is the safety committee which plans the society's safety program. Staff activities are under the general supervision of C. W. Briggs, technical and research director. Co-ordination of the committee's work, compilation of statistical data and organizational details relating to the poster and safety contests have been the responsibility of Erwin Dieckmann, SFSA office manager.

The committee itself is composed of eight members, each of whom represents one of the geographical divisions of the society. These members work closely with division directors. They head division safety committees, conduct safety meetings and disseminate national safety activity information to all division members. In 1953 and 1954, the committee met three times in each year to integrate activities and plan future moves.

Annual Safety Contest—Perhaps the most important single activity in the society's program is its annual safety contest. This competition is held during the months of June, July and August. In 1954, for example, 151 foundries entered, and it is significant that 66 of them won awards. Even more significantly, 47 of the 66 had a frequency rate of 0. There can be no more eloquent answer to the attitude that accidents are inevitable in foundries because of the nature of the production processes involved.

Fig. 4—The four posters shown here, printed in color and in a large size, won the 1955 contest

Entries in the contest are divided into four approximately equal groups on the basis of the number of man-hours of exposure per month. Competing groups were set up as follows: Group 1, 1 to 20,000 man-hours of exposure per month; Group 2, 21 to 35,000 man-hours; Group 3, 36 to 70,000 man-hours; and Group 4, 71,000 man-hours or more. Foundries with a frequency rate of 0 number 20 in Group 1, 16 in Group 2, 7 in Group 3, and 4 in Group 4.

These 47 foundries received the society's Highest Honor Safety Award (Fig. 2). Nineteen other awards were made to foundries which achieved a cumulative frequency rate for the contest period of 10.0 or less. These companies received Certificates of Safety Achievement. The 1955 contest is currently being conducted, and winners should be announced soon.

Safety Poster Contest—As an adjunct to the safety competition, the SFSA also conducts an annual safety poster contest open to all employees of member companies. This contest is conducted early in the year, in time for entries to be judged

STEEL FOUNDERS' SOCIETY OF AMERICA

LTI - 110

LOST TIME INJURIES REPORT

FOR MONTH OF FEBRUARY, 1955

The National Safety Council's definition of a Lost Time Injury is as follows: An injury which does not result in death or permanent impairment shall be classified as a temporary total disability if the injured person, because of his injury, is unable to perform a regularly established job, which is open and available to him, during the entire time interval corresponding to the hours of his regular shift on any one or more days (including Sundays, days off, or plant shut downs) subsequent to the date of injury.

Foundry Name	Exposure—Thousands of Man Hours	Number of Lost Time Injuries	Number of Lost Time Days	Injury Frequency Rate	Injury Severity Rate	Cumulative Injury Frequency Rate
Division No. 1						
Crucible Steel Co. of America	116	0	0	0	0	0
Taylor						

Fig. 5—Each month, the society compiles and mails a detailed lost-time injuries report which contains varied data on such accidents

at the society's technical and operating group meetings in early spring. Three winning posters are selected at a meeting of the technical and operating group of each division of the society, and prizes of $25, $15 and $5 are awarded to first, second and third place winners by each division. The three winning posters from each group are submitted to the national safety committee, and four are selected for use in the annual safety contest. Winners receive inscribed and framed awards (Fig. 3).

Each foundry in the annual contest receives copies of the top four posters. No. 1 is displayed from May 15 to June 1 to announce the contest to employees, and Nos. 2, 3 and 4 are displayed successively on June, July and Aug. 1. Fig. 4 illustrates the four posters used for this purpose in 1955. Eight additional posters submitted for final judging are reproduced in color for distribution to members of the society for use during the rest of the year.

Outside the area of contests, the society performs a number of services designed both to keep members safety conscious and to help them in the conduct of their safety programs. These services take a variety of forms.

Safety Articles—One of the more obvious ones is the regular publication of articles on safety in the society publication, *Steel Foundry Facts*. The March and April, 1954, issues, for example, contained an article entitled "It Can Be Done—Actual Case Histories of How Injuries Can Be Reduced in the Steel Foundry."

For this article, nine steel foundries with good histories of consistent reduction in frequency rates over the last several years were invited to explain how they had attained their good results. Each foundry was asked these questions: To what is your improved safety record attributed? What was the cost of your accident prevention program? How much savings did your company realize as a result of your safety program and reduced accident rate? Sizes of the companies involved ranged from small to large, with from 40 to 1600 employees, demonstrating that size has no relation to a successful reduction of accidents in a plant.

Typical of the small companies was Sumner Iron Works, Everett, Wash., which has 40 employees. This company reduced its accident frequency rate from 33.6 in 1948 to 7.9 in 1952, a reduction of 76.5 per cent. Its improved record was attributed to a program initiated and conducted by a safety engineer retained by the industries of the city of Everett. The engineer inspected machine safety guards, instructed supervisors and workmen in safe working procedures and held monthly meetings on safety with committees provided in the co-operating plants. Cost to the company, based on the monthly payroll, was about $75 per month.

At Alloy Cast Steel Co., Marion, O., with 170 employees, the frequency rate was reduced 78.9 per cent, from 47.8 in 1948 to 10.1 in 1953. Its improvement was attributed to six factors: Construction of a new cleaning room with well guarded safety aisles, increased area, better housekeeping and more efficient movement of materials; mandatory use of safety shoes; required use of leggings and goggles wherever leg or eye injuries might occur frequently; thorough policing of machine guards and screens; expansion of the safety committee to include the foreman and union committee man in each department; and monthly safety meetings. Cost of conducting the program has been very little, but has resulted in near minimum rates for state workmen's compensation.

Pelton Steel Casting Co., Milwaukee, has 300 employees. It reduced its frequency rate 51.2 per cent, from 41.0 in 1948 to 20.0 in 1953. Pelton reported that its only added cost had been $2000 for safety contest prizes in 1952 and 1953, and a study made by the firm's insurance carrier showed a cash-value saving of $12,562 over a 5-yr period.

Other companies which participated in preparing the article reported similar frequency rate reductions and savings, all aside from the immeasurable benefits to workers who avoided injury or death as a result of the successful programs.

The January, 1954 issue of *Steel Foundry Facts* carried an address by Earle M. Layman, chairman of the national safety committee and director of personnel, General Steel Castings Corp., Granite City, Ill., in which he discussed the safety problems and program of the society and challenged members to improve their records. In the December, 1954 issue, an article called "Not 'Too Hot To Handle'" pointed out that whereas accidents involving "broken equipment, tools or failure of such equipment through flaw" had been decreasing, the percentage of accidents involving material handling had been on the rise. Such accidents accounted for only 49.5 per cent of all accidents in the steel casting industry in 1949 and for 65 per cent of them in 1953. After stating the problem, the article, which was written by a member of the SFSA Safety Committee, went on to describe the most prevalent types of material handling acci-

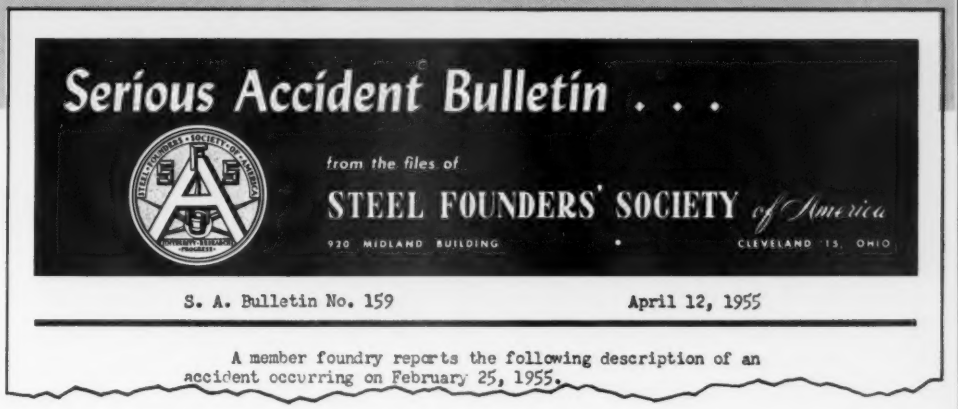

Serious Accident Bulletin . . .
from the files of
STEEL FOUNDERS' SOCIETY of America
920 MIDLAND BUILDING • CLEVELAND 15, OHIO
S. A. Bulletin No. 159 April 12, 1955
A member foundry reports the following description of an accident occurring on February 25, 1955.

Fig. 6—Members voluntarily send in details about serious accidents which then are written up in this report for the weekly mailing

dents and to point out how they might be avoided.

Reprint Other Articles—In addition to such material, *Steel Foundry Facts* also carries abstracts of safety articles which appear in current magazines. To supplement the safety material printed in the society publication, the SFSA regularly mails to members reprints of safety articles significant to the industry which have appeared in other publications. An annual analysis of accidents which occurred in member foundries also is compiled and distributed as an indication of situations which require particular attention.

Lost-Time Report—Similarly, the society compiles and mails a monthly *Lost Time Injuries Report* (Fig. 5). It contains a detailed report, listed by individual member foundries, on exposure hours, number of lost-time injuries, number of lost-time days, injury frequency rates, injury severity rates and cumulative injury frequency rates. A further feature of the report is an analysis of accidents by causes.

Serious Accident Bulletin—In conjunction with the lost-time report, the society also sends out in the weekly mailings a *Serious Accident Bulletin* (Fig. 6). This one-page publication, issued as serious accident reports come in from members, consists of a description of the accident concerned, an analysis of its causes and an explanation of what steps have been taken to prevent a recurrence of the incident. These bulletins are compiled from forms specially devised for the purpose and sent in voluntarily by members. For the purposes of the bulletins, all accidents which involve more than 30 days of lost time are considered to be "serious."

Safety Displays—As a part of the continuing effort to keep members of management safety conscious, the society erects displays of safety material of all types at its meetings. Fig. 7 Shows a typical example which contains material illustrative of the group's safety program activities. It contains safety and poster contest awards and certificates, posters, lost-time and serious accident report forms, reprints of safety articles and other items. Different displays have included examples of safety equipment and other material.

Safety Library—Still another aspect of the society's efforts is the maintenance of a library of safety manuals and rules which is available to the membership, along with any other advice or help the staff can provide.

Safety Manual—An important part of the program has been under way for some time and currently is nearing completion. This project is the development of a safety manual. Now in first-draft form, it will be made available as soon as the final version is ready.

In addition to their co-ordination, with the staff of the society, of the over-all activities of the membership, safety committee members carry on a program of activities at the level of the divisions, each of which has its own safety committee, headed by the national committee member. These committees conduct meetings of their own, meet with the other divisional officers, bring in speakers locally and in general work to promote safety activities of the society.

Through them, the whole program is filtered down through the divisions, eventually to the individual plants. Reports on their activities are submitted regularly. Occasionally, these committees present the entire program at divisional meetings, to emphasize the need for management to stay continually safety conscious and to help it develop and promote successful plant safety programs. Safety talks are given at both divisional and national meetings of the society.

In all its efforts, the Steel Founders' Society of America is overridingly aware of one fact: It must sell management on safety, for where management is complacent or inactive, no safety program can succeed.

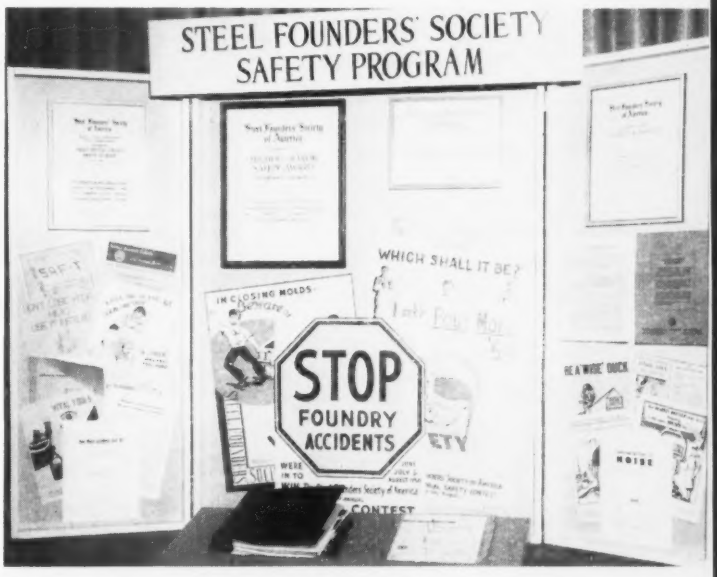


Fig. 7—Typical example of the kind of display which is a regular feature of SFSA meetings contains a variety of types of safety material

6208 Plants Casting Metals in United

STATISTICS prepared from the 1955-56 edition of *Penton's Foundry List,* just published by the Penton Publishing Co., Cleveland, show that 6208 plants now are producing castings in the United States and Canada. Before making comparisons of the data provided by this biennial study by FOUNDRY with a similar report prepared in 1953, it is necessary to consider several refinements which have been made this year.

For the first time die casting plants have been included in *Penton's Foundry List.* Because of the importance of this growing industry, a total of 680 plants, of which 492 are exclusive die casting plants, was added. At the same time, the 1955 tabulation from directory data eliminates 126 school and laboratory foundries, so that the column "Total Foundries" in the accompanying table represents only establishments producing castings for sale or own use.

The 1955 total for the United States and Canada, taken on the same basis as in 1953 which excludes exclusive die casting plants and includes school and laboratory foundries, is 5842. This compares with 5938 in 1953, a net loss of 96 plants. Considering the slack demand for castings during 1954, the small net loss is exceptionally gratifying.

GEOGRAPHICAL DISTRIBUTION OF THE COUNTRY'S FOUNDRIES

	Total Foundries		Gray Iron Foundries		Steel Foundries		Malleable Foundries		Total Nonferrous		Exclusive Nonferrous Foundries		Brass & Bronze Foundries		Aluminum Foundries		Magnesium Foundries	
	1955	1953	1955	1953	1955	1953	1955	1953	1955	1953	1955	1953	1955	1953	1955	1953	1955	19[illegible]
Alabama	100	105	82	88	10	9	2	3	45	32	14	8	24	16	39	28	1	..
Arizona	7	7	4	3	1	3	..	..	4	5	3	2	3	3	4	3	..	..
Arkansas	24	18	11	12	1	1	..	..	17	11	12	5	7	5	16	10	2	..
California	532	481	126	139	41	35	3	4	422	364	370	304	228	217	352	304	45	33
Colorado	53	44	20	20	4	5	..	..	40	27	31	21	24	17	37	25	1	..
Connecticut	160	145	46	55	6	6	6	6	125	103	106	81	81	82	100	82	9	5
Delaware	8	9	2	3	3	3	1	1	4	5	3	3	4	5	2	3	..	..
Dist. of Col.	3	2	2	2	1	2	1	1	3	2	1	...	3	2	3	2	1	1
Florida	53	45	19	20	1	1	..	..	49	38	33	23	32	27	45	35	2	3
Georgia	66	69	45	50	4	3	..	..	35	35	17	16	28	24	32	31	1	..
Idaho	8	7	7	6	1	1	..	..	6	5	...	...	4	5	6	4	..	..
Illinois	485	436	160	177	32	35	19	18	336	252	290	208	166	159	260	203	18	12
Indiana	246	231	111	117	9	9	8	8	153	116	122	93	84	84	116	96	9	6
Iowa	85	88	55	57	2	3	1	1	49	43	28	26	26	26	44	36	2	1
Kansas	54	54	26	29	2	1	..	..	34	27	28	22	16	17	29	24	5	5
Kentucky	27	33	19	22	1	1	..	..	14	20	7	8	12	16	9	13	1	1
Louisiana	31	34	17	19	6	5	..	1	19	19	10	10	15	14	15	14	1	..
Maine	24	22	19	17	..	..	..	..	19	14	6	5	17	14	17	10	..	1
Maryland	48	43	21	20	2	2	2	2	35	28	25	20	26	24	31	23	3	2
Massachusetts	233	222	91	97	13	13	3	4	167	144	132	109	135	125	135	117	11	8
Michigan	436	386	156	170	29	31	8	9	293	218	258	180	149	152	193	152	36	16
Minnesota	95	95	50	54	7	5	1	1	54	44	38	31	38	34	47	39	3	3
Mississippi	13	11	10	11	..	..	..	..	9	6	3	...	7	5	5	5	..	..
Missouri	138	127	46	44	11	11	1	1	92	82	84	73	58	53	80	70	3	4
Montana	5	7	5	5	..	..	..	..	4	4	...	1	4	3	2	3	..	..
Nebraska	26	26	13	14	1	1	..	..	22	21	12	10	14	15	19	19	1	1
Nevada	2	2	2	2	1	..	..	..	2	2	...	...	2	2	2	1	..	..
New Hampshire	23	26	12	16	2	3	1	1	2	17	...	8	16	17	18	13	2	1
New Jersey	233	223	73	86	16	15	2	2	179	159	147	123	113	126	127	122	11	9
New Mexico	4	5	1	2	..	..	..	..	4	3	3	2	4	2	3	3	..	..
New York	413	408	146	162	29	27	10	11	311	288	238	211	215	227	241	240	19	17
North Carolina	65	67	54	56	..	..	..	..	48	42	12	10	38	38	43	39	2	..
North Dakota	3	3	3	3	..	..	..	..	3	2	...	...	1	2	3	2	..	..
Ohio	585	569	223	237	38	35	17	20	383	331	315	274	233	213	299	256	26	18
Oklahoma	46	41	23	22	1	2	..	..	29	27	21	18	18	20	22	23	..	2
Oregon	65	62	33	34	9	8	..	..	39	31	25	20	31	27	31	24	3	2
Pennsylvania	526	513	266	290	64	67	13	12	312	269	210	168	235	222	244	192	7	8
Rhode Island	43	39	14	13	..	..	1	1	29	27	28	25	20	23	20	21	..	..
South Carolina	22	25	17	20	1	1	..	..	18	19	5	4	17	17	16	18	2	2
South Dakota	3	3	3	3	..	..	..	..	2	1	...	...	1	1	2	1	..	..
Tennessee	75	75	58	62	3	4	..	..	46	36	17	12	33	27	36	32	3	1
Texas	153	143	69	75	13	11	1	1	105	86	76	59	78	70	90	71	4	6
Utah	18	19	15	16	1	2	..	..	8	8	3	3	6	8	5	7	..	1
Vermont	16	19	14	15	..	..	..	..	7	8	2	4	5	8	6	6	..	..
Virginia	54	58	48	50	5	5	1	..	35	31	6	5	31	29	28	22	1	..
Washington	75	74	37	38	17	18	1	1	54	51	31	27	43	43	47	42	2	2
West Virginia	33	39	16	20	2	3	1	1	19	21	14	15	18	20	13	15	2	1
Wisconsin	233	226	111	118	21	17	11	11	138	116	100	83	95	90	112	101	6	4
Wyoming	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total	5,650	5,387	2,402	2,591	411	404	115	121	3,839	3,240	2,895	2,330	2,458	2,376	3,046	2,602	245	176
Canada	558	551	327	363	41	36	15	16	373	364	204	168	265	284	309	313	16	13
U.S. & Canada	6,208	5,938	2,729	2,954	452	440	130	137	4,212	3,604	3,099	2,498	2,723	2,660	3,355	2,915	261	189

States and Canada

Nonferrous Gains: With die casting plants included, nonferrous foundries showed a sizable gain. At present 4212 foundries are producing nonferrous castings, compared to 3604 in 1953. Exclusive nonferrous shops increased from 2498 in 1953 to 3099 at present. Plants producing brass and bronze castings increased from 2660 to 2723, those making aluminum castings from 2915 to 3355, and those pouring magnesium from 189 to 261. Zinc castings are being produced by 796 foundries. In this connection it should be mentioned that the figures for total foundries and total nonferrous foundries are not the sum of data for individual metals, since many plants are casting more than one metal.

Fewer Ferrous Shops: Losses were shown in two of the three ferrous categories. Gray iron foundries declined from 2954 to 2729, or a loss of 225 plants. The number of foundries pouring steel castings increased from 440 to 452, probably due to a greater number of plants producing steel in investment molds. Malleable foundries declined slightly from 137 in 1953 to 130.

Leading States: Ohio continues as the leading foundry state in total number of plants with 585, California is second with 532, Pennsylvania third with 526, Illinois fourth with 485 and Michigan fifth with 436. Wyoming is the only state without a foundry.

Special Processes: Increases are shown in the number of companies producing castings in permanent molds, centrifugal molds, plaster molds and investment molds. A really remarkable increase is found in the field of shell molding, where the number of companies using the process increased from 197 in 1953 to 422 at the present time.

Zinc Foundries 1955	Permanent Mold Producers 1955	Permanent Mold Producers 1953	Centrifugal Casting Producers 1955	Centrifugal Casting Producers 1953	Plaster Mold Producers 1955	Investment Mold Producers 1955	Die Casting 1955	Shell Mold Producers 1955	Pattern Shops 1955	Jobbing Foundries 1955	Captive Foundries 1955	Jobbing & Captive Foundries 1955	
..	2	7	7	7	2	1	1	4	75	43	10	47	Alabama
..	2	4	2	..	1	..	..	2	6	2	..	5	Arizona
..	5	8	4	..	..	1	..	5	2	13	10	2	12	Arkansas
33	93	102	102	32	34	15	18	80	32	252	309	70	153	California
..	7	16	12	..	..	2	..	9	2	26	23	8	22	Colorado
5	33	23	16	4	2	4	2	23	10	75	92	23	45	Connecticut
..	..	....	....	..	..	..	..	..	..	5	2	1	5	Delaware
1	2	1	1	1	1	1	1	..	1	2	1	2	..	Dist. of Col.
3	19	11	11	4	2	3	..	7	1	34	22	5	26	Florida
..	3	10	6	1	..	4	..	4	5	47	19	12	35	Georgia
..	1	3	1	..	..	..	..	..	1	6	3	..	5	Idaho
12	92	55	43	10	10	15	10	92	40	266	258	76	151	Illinois
6	16	31	21	6	6	7	3	29	21	143	121	47	78	Indiana
1	11	9	10	..	..	2	2	10	..	57	31	17	37	Iowa
5	5	6	5	1	..	6	1	4	..	36	22	8	24	Kansas
1	4	1	1	..	1	..	1	1	..	19	10	4	13	Kentucky
..	3	4	3	..	..	..	..	1	..	22	12	6	13	Louisiana
1	3	1	1	..	..	1	..	..	..	16	9	3	12	Maine
2	8	8	3	1	2	3	..	4	1	26	19	10	19	Maryland
8	27	16	16	8	9	11	9	16	18	138	136	37	60	Massachusetts
16	89	46	50	16	20	15	10	81	44	209	252	53	131	Michigan
3	12	13	9	2	1	2	4	10	4	52	49	10	36	Minnesota
..	1	2	2	..	..	..	..	..	..	9	4	3	6	Mississippi
4	17	20	21	3	3	5	3	17	14	71	69	15	54	Missouri
..	1	1	2	..	..	..	..	..	..	4	1	1	3	Montana
1	5	6	5	..	..	2	..	3	1	21	6	9	11	Nebraska
..	..	1	1	..	..	..	..	1	1	2	1	1	..	Nevada
1	1	1	1	..	..	..	2	1	1	16	7	..	16	New Hampshire
9	42	29	28	12	10	9	8	35	23	119	145	35	63	New Jersey
..	..	2	....	..	..	..	..	1	..	3	2	..	2	New Mexico
17	61	46	43	15	21	12	27	51	40	223	201	65	147	New York
..	3	3	2	1	..	3	..	3	..	42	24	14	27	North Carolina
..	..	....	....	..	..	..	..	..	..	3	1	..	2	North Dakota
18	57	67	62	27	21	29	11	56	33	343	325	90	170	Ohio
2	6	1	4	3	2	1	..	3	3	29	22	6	18	Oklahoma
2	7	4	3	3	3	..	1	6	7	30	32	4	29	Oregon
8	37	40	30	18	22	9	6	35	35	355	246	77	203	Pennsylvania
..	7	4	2	3	1	4	1	4	4	18	27	2	14	Rhode Island
2	2	....	....	..	..	..	1	2	1	18	11	2	9	South Carolina
..	..	1	....	..	..	..	..	..	..	3	1	1	1	South Dakota
1	4	7	5	1	1	4	1	4	2	59	22	12	41	Tennessee
6	16	22	16	6	5	1	2	13	10	86	76	9	68	Texas
1	..	2	3	1	2	..	..	1	2	10	10	3	5	Utah
..	..	....	1	..	..	..	..	..	1	13	4	3	9	Vermont
..	6	8	6	2	4	3	2	3	3	38	22	7	25	Virginia
2	11	6	3	3	2	1	1	3	5	47	40	6	29	Washington
1	..	4	3	4	3	1	1	..	2	23	15	1	17	West Virginia
4	20	28	31	13	9	3	3	20	20	131	122	28	83	Wisconsin
..	..	....	....	..	..	..	..	..	..	..	..	..	..	Wyoming
176	741	680	598	208	205	181	132	639	396	3,242	2,881	798	1,971	Total
13	55	81	59	27	16	11	11	41	26	376	204	64	290	Canada
189	796	761	657	235	221	192	143	680	422	3,618	3,085	862	2,261	U. S. & Canada

Questions and Answers

Carbon dioxide reacts with sodium silicate to form a silica gel which functions as a binder . . . Oxide inclusions in aluminum alloy probably are caused by something other than the fuel . . . Low bond in molding sand causes trouble . . . Crucible heating procedure . . . Rough casting surfaces . . . Gas in iron

Carbon Dioxide Hardens Mold

QUESTION We have heard of a new molding process which was developed in Germany using carbon dioxide and sodium silicate. Do you have any information on it? We are interested in tolerances, cost, availability of materials, etc. Will ordinary mold washes work or are special ones needed?

ANSWER While much of the information relating to the CO_2 process came from Germany, early development work also was done in other countries.

The bond material, based on sodium silicate, is converted to a silica gel by use of carbon dioxide gas. According to available information, about 2½ to 5 per cent of the bond, which is in liquid form, is added to dry sand and mixed for 4 to 5 minutes. Sand may or may not contain additives such as seacoal, wood flour, pitch, etc. Bonded sand may be rammed or blown into flask or corebox; while still in place it is subjected to the action of carbon dioxide gas at 10 to 20 psi gage pressure by any one of several procedures. One method is to make a number of small holes on 4 or 5-in. centers almost to the interface between sand and pattern, and inject the gas through a tube or tubes starting at the bottom and moving gradually upward.

Another method is to place a tight cover with suitable openings for admission of gas over the flask or box, while a third is to provide suitable gas openings in the pattern or corebox. Gas injection may vary from a few seconds to minutes, depending on method and thickness of sand to be treated.

After gas treatment the mold or core is removed from its container and is ready for use. While we have no figures on tolerances, the formed sand is not removed from the pattern or corebox until it is hardened, so it should conform closely to dimensions. As to cost, a British source indicates the silicate bond material sells for about 5 cents a pound and the CO_2 will run from 5 to 15 cents per 100 lb of sand treated.

Mold coatings seemingly are not necessary with aluminum, but are preferable with ferrous alloys. It appears that any of the usual washes will operate satisfactorily. If they are water-base type the core or mold must be dried before use. More details on the process were presented in the June issue, p. 84.

Trouble with Oxide Inclusion

QUESTION We operate six gas-fired crucible furnaces for melting and holding aluminum, and are having trouble with oxides forming. We consulted the gas supplier and we were told that we were using an improper mixture of gas and air, but could not tell us what it should be. Can you supply any information?

ANSWER Correct method of determining when proper combustion conditions exist is to analyze the furnace gases with an Orsat or other apparatus to determine the quantities of carbon dioxide, carbon monoxide and oxygen present. You do not state the kind of gas you are using, but if it is natural gas, it will require theoretically about 9.5 cu ft of air per cu ft of gas. If manufactured gas, the requirement will be about half of that. However, in practice an excess amount of air is required for good combustion. If the burner flame is sharp and entirely blue, you are using about the right amount of air. If reddish and ragged, the air is too high, and if the flame is yellow or yellow tinged, the air is low.

While it is possible that the oxide inclusions may result from improper combustion conditions, we suspect some other source. The metal should be melted at the lowest possible temperature which will operate satisfactorily with the holding and pouring operations. Holding furnaces should be at temperatures just sufficiently high to permit carrying the alloy to the pouring station and pouring at the proper temperature. The various temperatures should be determined experimentally, and then followed closely.

Handling the molten alloy or alloys is important also. If the alloy is poured from excessive heights from furnace to crucible, and crucible into mold, there will be a greater tendency toward oxide inclusions than when the distance is held to a minimum. Excessive or careless stirring also increases oxide inclusions. Look to your purchased scrap as a source of the inclusions. Possibly use of dry or gaseous fluxing agents in the melting furnace before transferring to the holding furnace might help the situation.

Problem in Sand Conditioning

QUESTION We are experiencing considerable difficulty in maintaining good properties in the molding sand used on our squeezer machines. As a base sand we are using a New Jersey molding sand which is conditioned in heaps on the floor by adding a special mix incorporated by a sand cutter. Heap sand shows AFS fineness of 120, AFS clay 10.6, permeability 37, green compression strength 4 psi, moisture 6.9 per cent. To each floor each night we add four batches of mulled sand composed of 60 lb new sand, 180 lb heap sand, 3.6 lb southern bentonite, 1.8 lb western bentonite, 5 per cent moisture. We attempt to maintain the moisture between 6 and 7 per cent. With the described procedure we seem to be unable to raise the green compression strength much above 4 psi.

Our major scrap problem seems to be directly related to sand conditioning as we are plagued with sags, drops, rat tails, cuts and washes. Castings weigh from ounces up to 10 lb, and must have a fine finish. It has been recommended we blend No. 1 Albany with the New Jersey sand to maintain the present green strength without having to add the fortified sand mix since it is said that the former does not burn out and lose its green strength as rapidly as the other. Can you suggest steps to improve our sand conditioning and reduce our scrap? What should we aim for as to properties, and what should be done to obtain them? What long-range steps should be taken in improving our sand conditioning? Since our volume is about 60 tons a month, should we consider mulling all our sand, mull only facing or improve our present practice of conditioning heaps on the floor?

ANSWER Primarily your sand is quite low in bond, as indicated by the figure of 4 psi for green compression strength; it probably should be half again as much or possibly more. While you do not indicate definitely what constitutes a batch of the "fortified" sand and the amount

of heap sand involved, we believe you are increasing the bond of the heap by only a few tenths of a per cent instead of what you think. As a result, there is only a slight improvement in green compression strength.

Since it is difficult to state what molding sand characteristics or properties are most suitable for your operations, we suggest that you do a little experimental work. Use small batches of sand to make up a number of molds until you find the one that functions satisfactorily. According to information available, the addition of 1 lb of bentonite per 100 lb sand will increase the green compression strength 2 psi. Hence, we suggest you mull up a batch of heap sand of sufficient weight and size on that basis to make several molds of the castings giving the most trouble, and observe the results obtained. This should enable you to determine the direction in which to proceed.

After doing this you will have to translate the results to the sand heaps. You probably will find that since the sand cutter does not have the intensive mixing action of the muller, you will need more bond than indicated in the experimental work. However, since at present your heaps are low in bond, it may be wiser to build them up gradually than to try to do it in one fell swoop. Also as indications are that considerable quantities of bentonite will have to be added, we suggest you follow your present method of making "fortified" batches containing 15 per cent of bentonite which are mulled for 6 to 15 minutes, and then adding the necessary amount of that to the heap.

It should be pointed out that after you attain the desired point in bond in the heap sand, smaller quantities will suffice as regular additions. Hence, it will be wise to keep a close watch on the sand properties and the castings and make suitable adjustments from time to time until you are running on an even keel.

As far as long range steps relative to sand conditioning are concerned, that is something which will have to be determined for your own conditions. Many foundries appear to be using sand cutters with satisfaction presumably because their operation is placed in the hands of reliable employees who follow instructions carefully. If you decide to mull all the sand every night, you will have to have the equipment to handle the sand and equipment to carry the sand to and from the mulling equipment. While use of facing has advantages, it means extra operations, and if you can get along without it as you apparently are, we suggest you follow that practice.

Method for Heating Crucibles

QUESTION The article in the March issue on use and care of crucibles has many helpful items, and brought up a discussion on the proper method of heating graphite crucibles. Some were of the opinion that it made no difference whether they were heated from the inside out—as with the insertion of a burner—or from outside in by placing in a pit furnace.

ANSWER Since development of a glazed surface on the exterior of a graphite or silicon carbide crucible is important in securing a good life, as indicated in the article you mention, it is preferable to place the crucible in the furnace for the "breaking in" operation. According to the Crucible Manufacturers' Association, clay-bonded graphite crucibles should be brought slowly up to temperature by a low oil or gas flame with reduced air supply. With carbon-bonded silicon carbide crucibles the temperature is brought up as rapidly as possible to prevent burn-out of bond before the glaze is developed.

Casting Surface Is Too Rough

QUESTION We are forwarding two brass castings to indicate some difficulty we are encountering. These contain pitted surfaces which prevent obtaining suitable polished and buffed finishes. Also, the 85-5-5-5 alloy cracks when bent. Can you give us any suggestions relative to molding and core sands, or metal to use for such hinge castings?

ANSWER As you indicate, the major cause of your difficulty in obtaining a satisfactory polished and buffed surface is the sand used. It is much too coarse for such castings unless you want to spend considerable time in rough polishing or cutting down, as it is termed, but that is rather expensive.

While it is easy to say that a finer sand should be used, it is another matter to state what it should be. Practices and procedures vary from foundry to foundry, and a sand satisfactory in one will not be so in another. Also, it should be pointed out that as the sands become finer they are less permeable, so a compromise must be made by selecting a sand which will not result in blows but will still provide a smooth as-cast surface.

We suggest that you obtain a small batch of fine sand sufficient to make up a few molds, and experiment with it. We believe that you should try a sand with an AFS grain fineness of 150. Results obtained will indicate whether a coarser or finer sand should be tried. Similarly, try a finer grain size of core sand than you now are using.

You mention that the castings crack when bent. If bending is a desired characteristic of these parts, use the 70 per cent copper—30 per cent zinc alloy commonly called chandelier brass or dip metal. It possesses fluidity to cast into thin sections and can be formed into shapes when cold.

Iron Shows a Gassy Condition

QUESTION We are sending for your examination a small piece from one of our gray iron castings which is indicative of our trouble with large and small castings. This does not appear in all castings, but only in part of the heat. Iron is hot from the first tap. Sometimes it throws off sparks and when a mold is poured the iron backs up in the sprues and risers.

ANSWER The section of casting submitted for inspection is full of gas holes which apparently result from gas absorbed during melting, or picked up shortly thereafter. We suspect from your description of the trouble occurring during some parts of the heat that you may be operating with a critical height of bed. Under certain conditions the bed tends to burn away too fast, and oxidation of the iron occurs. Again it might be that the splits of coke between charges are too small. A third possibility is use of ladles which are not dried thoroughly.

First thing we suggest is to check the bed height after burning in and see that it is within the range usually employed for the size of cupola you are using. It might be a good idea to try it on the high side to begin with and then gradually reduce it to a satisfactory point. Watch the heats carefully after making the change in the bed, and if the trouble you mention moves toward the latter part of the heat, then the coke splits are too small to replenish the bed coke which is burned in melting each charge. Increasing the splits by a sufficient amount should eliminate the difficulty with gassy iron.

Melting Loss Is Excessive

QUESTION We are melting brass in an oil-fired rotating furnace, pouring castings up to 4000 lb and obtaining good results. However, we appear to have a melting loss of about 20 per cent, which seems high to us. Do you have any information on what the loss should be? We use only ingot metal (85-5-5-5 alloy) with return gates and risers.

ANSWER While losses in furnaces where the flame comes in direct contact with the metal is higher than when that condition does not exist, your figure of 20 per cent seems extremely high, especially in view of melting relatively chunky material such as ingot, gates and sprues.

We doubt seriously that your loss is that high, and suggest that you conduct a supervised test to determine what the actual loss is. Procedure is to weigh carefully all charged metal and melt. Molten metal taken from the furnace also should be weighed carefully just after skimming. Skimmings should be crushed and examined for metallic content. Difference between the weight of metal charged and that taken off in the pouring ladles plus the metal found in the skimmings will give the loss in melting. We are sure that you will find the loss considerably under the figure you mention, and probably is under 6 per cent.

Wants Structure To Be Open

QUESTION We have been requested to make a few small gray iron castings about 2 in. in diam and ½-in. thick with a concave face. They are to be used in a lapping operation, and the iron must be of open structure to hold the abrasive. Our charges weigh 500 lb and contain 40 per cent pig iron containing around 2 per cent Si, 40 per cent purchased scrap and 20 per cent remelt. Silicon briquets are used to give us an analysis of about 2.20 per cent Si. How can we make an iron which will serve?

ANSWER Open-structure iron usually is one in which the silicon content is much too high for the section involved, a condition foundrymen try to avoid. While you do not specifically say so, we gather that you are not making enough of these castings to require a full charge of iron. If you were, it would be an easy matter to increase the silicon content to 2.75 per cent or more by addition of silicon briquets, and obtain an open or coarse structure.

However, assuming that you just have a small quantity of the castings to make, it may be possible to accomplish the desired results by adding sufficient ferrosilicon to the ladle. We suggest about 1 lb of the 80 per cent grade to 100 lb of iron. Iron, of course, should be good and hot when the addition is made.

Another method would be to place the castings, made of the present composition, in a furnace and raise the temperature to 1500 to 1600° F. Hold at that temperature for at least one-half hour and then slowly cool in the furnace. This should result in decomposition of the pearlite into graphite and ferrite and provide a coarse structure.

Not Difficult To Make Shot

QUESTION We are about to reopen a small nonferrous foundry and in the past we used slab zinc as a source for the small fragments necessary to compensate for vaporization in melting brass. That practice is time consuming and involves the labor of hacking off the small pieces with a cold chisel and sledge. We would like to eliminate that and would like to know if there is any finely divided form of zinc available.

ANSWER Metallic zinc is available in shot, stick, rod and sheet form to mention a few, but since you probably already have slab zinc on hand there is no reason why you cannot make your own shot. Easiest way is to slowly pour molten zinc from a small ladle held a few feet above a pail filled with water.

Another method is to pour from about the same height onto a piece of board set at an angle of about 45 degrees and projecting into the water pail about half the width of the pail opening. Adjust the metal stream so that is strikes the board about half way between the end and the edge of the pail. A third method would be to pour the molten zinc slowly through a piece of ⅛-in. mesh screen held a couple of feet above the pail of water.

Blade Contraction Hindered

QUESTION In casting steel propellers we have run into difficulty in that the blades crack off from the hubs, evidently from a hot tear developing in those areas. Can you suggest a remedy?

ANSWER Assuming that the steel composition is such that there is no extra tendency toward hot tearing, such as high sulphur content or presence of tin above 0.04 per cent, the difficulty is due to the inability of the blades to contract toward the hub. Possible causes of that condition might be extra heavy pop-offs placed at the ends of the blades, or possibly a gate so placed, combined with a hard-rammed mold.

Gate should be at the hub and not at the end of the blade. Sometimes heavy fins at the ends of the blades, caused by a poor fit between cope and drag, might cause the trouble if the mold is rammed extra hard. Therefore, you should see that there are no obstructions to prevent free contraction of the blades. It will help if brackets are cut at the junctions of blades and hub. Fairly heavy chills at those heavy sections will promote solidification there before contraction has progressed sufficiently to place much strain on the blades.

Sand Property Causes Trouble

QUESTION We are having trouble in casting flat aluminum plates about 2 ft square and ⅝-in. thick, and have difficulty in making them without sand cracks showing up on the faces. Can you suggest how to eliminate that difficulty?

ANSWER Usually sand cracks are the result of expansion and contraction, and the remedy is to adjust the molding sand characteristics to minimize those effects. Possibly your flask equipment may not be rigid enough or it may be warped sufficiently to cause cracks to develop in the mold face in handling from pattern to the area where the mold is poured. Again the trouble may arise from hard ramming which, by forcing the sand grains closer together, does not allow room for expansion. The result is that the sand squeezes out in a ridge along the mold face.

Too much fines in the sand cuts down the expansion space, as does low clay content. Also low clay content, resulting in a "weak" sand, often leads to hard ramming by the molder to produce a mold face which will "hold up." Hence, it may be worthwhile to look into that phase. If the cracks appear only around the gate area it is an indication that the sand is being overheated, and more gates should be used so that less hot metal flows over any given section of the mold.

Blows Caused by Metal Insert

QUESTION We are making an open-end aluminum alloy casting in which it is necessary to cast-in a steel tube in one wall. We encounter blows in that area which, although they do not cause rejection of the casting, we would like to eliminate. Do you have any suggestions on accomplishing that?

ANSWER Major causes of blows where metallic inserts are incorporated in the castings are dirt and moisture. By dirt is meant presence of oil, grease or oxide films on the insert. They usually generate gas when the molten metal comes in contact with such films, and kick back into the metal. Metal inserts should be cleaned thoroughly by abrasive blasting and maintained in that condition until they are used.

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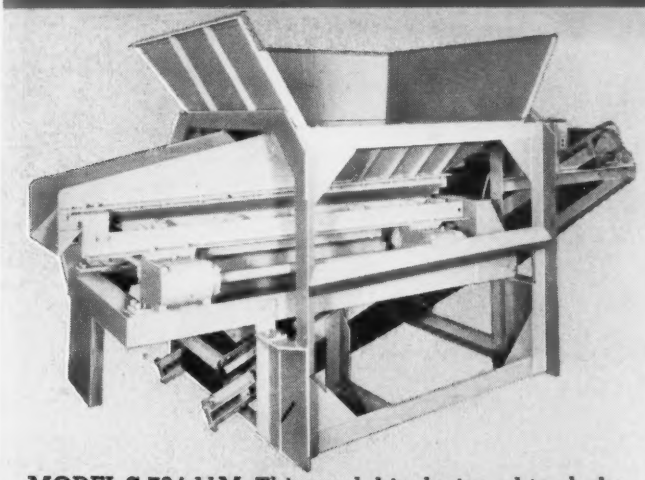
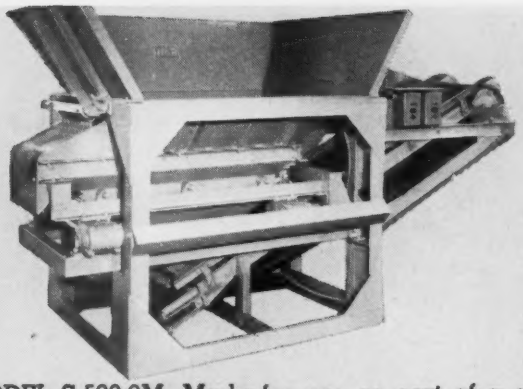


MODEL S-724-11M. This model is designed to shake-out castings and clean sand in one operation. Sand and castings scooped from the molding floor are charged into the hopper and onto a Royer Shake-Out. Castings are discharged at one end at proper height for feeding a table or conveyor where they can be sprued and sorted. Completely cleaned sand is discharged at the opposite end.

CHECK THESE FEATURES

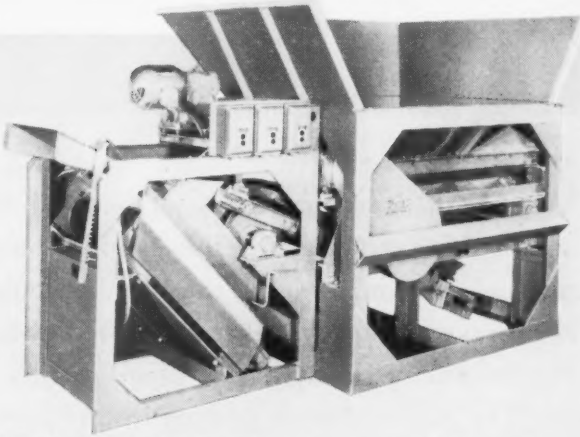
1. **Up to 60 tons of clean sand per hour.**
2. **No pits . . . no excavating.**
3. **Low receiving hopper.**
4. **High sand and scrap discharge.**
5. **Rugged Shake-Out utilized as a riddle.**
6. **No screens to clog.**
7. **Easily made portable.**
8. **Readily relocated.**
9. **Four-sided 5 ton capacity hopper available for all units.**



MODEL S-522-9M. Made for use as part of a centralized sand system. The large open-sided hopper directs the complete charge from a front end loader onto a Royer Shake-Out where the large scrap is riddled out. Magnetic separation removes the fine scrap; sand is discharged into a Royer Sand Separator and Blender or the skip hoist to a muller.

The new series of Royer "Scrap Control", with its versatility of application, can supply a varied amount of mechanized casting removal, sand cleaning and conditioning. Here is a unit that puts "mechanization" within the reach of all . . . supplying the benefits of labor saving and production line operation at lowest possible cost.

Take this opportunity to cut down the high cost of hand labor in your sand conditioning operations. Verified results show up to 50% of a night crew released for other work, with the damage by tramp iron to pattern equipment eliminated and scrap losses reduced 75%. We will be glad to study your operation and recommend the proper equipment . . . no obligation, of course.



MODEL S-522-5MR. Here is a complete packaged sand cleaning and conditioning unit. Fed by front end loader, the sand is cleaned by a Royer Shake-Out and magnetic separator, tempered and given final preparation by a Royer Sand Separator and Blender. Unit can be moved by overhead crane, setting up the conditioning operation where desired.

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ROYER FOUNDRY & MACHINE CO. 159 PRINGLE ST. KINGSTON, PA.

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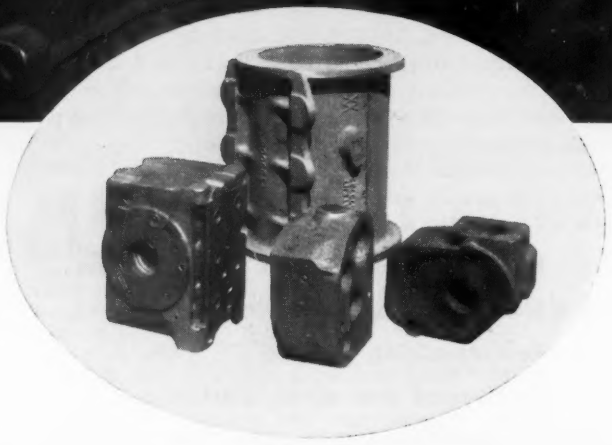

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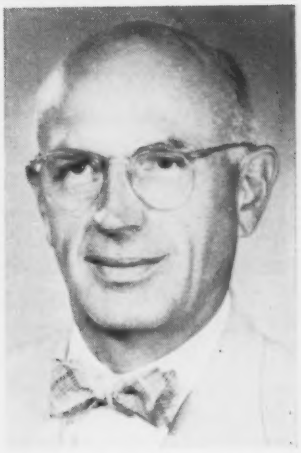


EDGAR D. FLINTERMANN
. . . joins Detroit Gray Iron

JOHN A. RASSENFOSS, formerly assistant research director, American Steel Foundries, East Chicago, Ind., was appointed manager of the Manufacturing Research Laboratory, a consolidation of the former research laboratory and the process development department. **C. G. Mickelson** and **P. J. Neff** were appointed assistant managers. Mr. Rassenfoss joined the company's laboratory in 1941, after receiving a master's degree in metallurgical engineering from University of Kentucky. He was president of the Chicago Chapter of the AFS in 1953-54 and in the former year received the Steel Foundry Facts Award from the Steel Founders' Society of America.

C. Roger Sutton, for the last 5 years senior metallurgist at the Argonne National Laboratory, U. S. Atomic Energy Commission, has joined the Development and Research Division, International Nickel Co., New York, as a member of the stainless steel and heat-resistant alloys section. Mr. Sutton is a graduate of University of Detroit.

G. Allen Lovell, formerly assistant general manager of the mechanical goods division, United States Rubber Co., New York, was elected a vice president of the company and general manager of the division. He joined the company in 1918.

George C. Betz was appointed manager of sales, chemical and metals department, Metal & Thermit Corp., New York. Since 1944 Mr. Betz was with the company as sales manager of the ceramics department.

Glenn F. Ihrig, since 1950 assistant sales manager, was appointed general sales manager, Wellman Bronze & Aluminum Co., Cleveland. He joined the company in 1943 and was one of its sales representatives for six years.

Francis J. Brickle was recently appointed district manager in charge of crane and hoist sales in the New York office of Harnischfeger Corp., Milwaukee.

John B. Davies, manager of industrial sales, Mine Safety Appliances Co., Pittsburgh, was elected president of the Industrial Safety Equipment Association. A graduate of Carnegie Institute of Technology, he has been with Mine Safety Appliances since 1919.

E. C. Conary was recently appointed general manager, Genessee Foundry Co., Syracuse, N. Y. A graduate of Missouri School of Mines and Metallurgy, he has held technical, production and administrative positions with American Steel Foundries, Oliver Corp. and Arcade Malleable Iron Co., Worcester, Mass.

James W. Volk was named sales manager, Steel Fabricating Division, Michiana Products Corp., Michigan City, Ind. A graduate of University of Michigan, he was in the division's sales department since 1949.

William Probst, president - manager, Chemalloy Foundry Inc., Louisiana, Mo., has resigned to become manager, Louisville Casting Co., Louisville.

Edgar D. Flintermann has been elected executive vice president, Detroit Gray Iron Foundry Co., Detroit. Mr. Flintermann, who recently resigned as president, Misco Corp., Detroit, was president of Michigan Steel Casting Co., there, from 1934 until 1952 when he was named head of the Misco group consisting of the Michigan Steel Casting plants and several other metal working companies. He was president of the Steel Founders' Society of America in 1946 and in 1948 received the Lorenz Medal of that organization for his contributions to the society and to steel casting industry progress.

Adm. Alan G. Kirk, chairman of the board of directors and president, the Mercast Corp., New York, was also elected president, Alloy Precision Castings Co., Cleveland, succeeding **Ronald D. Gumbert,** resigned. Admiral Kirk continues as chairman of the board of Alloy, subsidiary of Mercast. **Frank W. Glaser** was named general manager of Alloy, continuing as vice president of the company.

Peter W. Schipper, general manager, Investment Casting Division, Howard Foundry, Milwaukee, has been named a director of the Investment Casting Institute, Chicago, and will fill the vacancy on the board of directors created by the resignation of **K. J. Yonker.**

O. A. Olson, formerly project engineer, was appointed assistant director of research, Laclede-Christy Division, H. K. Porter Co., St. Louis;

SAMUEL M. FELTON
. . . AC&F Division pres.

THOMAS L. HUMBLE
. . . joins Aluminum Industries

F. P. VON MEYER
. . . joins W. H. Anderson Co.

LLOYD L. STOUFFER
. . . Pangborn Corp. vice pres.

Mr. Olson spent 8 years in production and for the past 9 years was engaged in research activity for Laclede-Christy Division.

Samuel M. Felton was elected president, American Car & Foundry Division, ACF Industries Inc., New York. Since 1950 Mr. Felton was president of Shippers' Car Line Corp., an ACF subsidiary. Previously he was president of the American Railway Car Institute.

Harold M. Gowing recently was appointed manager of public relations, Electric Steel Foundry Co., Portland, Oreg. For the past two years he was personnel and safety supervisor for the City of Portland.

Richard J. Greene has been named head of International Nickel Co.'s Southeast States Technical Field Section, Development and Research Division, recently opened in Atlanta to cover North and South Carolina, Georgia, Florida and Alabama. Mr. Greene was graduated from Rensselaer Polytechnic Institute and joined the company in 1945. Recently he was a member of the Central Atlantic Coast technical section in New York.

Thomas L. Humble was appointed vice president-general manager in charge of production, Aluminum Industries Inc., Cincinnati. Mr. Humble attended Wayne University and in 1933 joined the Chrysler Corp., Detroit. Until recently he was a member of the vice president's staff of its Plymouth Division.

F. P. von Meyer has been appointed production manager of the manufacturing division, W. H. Anderson Co., Detroit, maker of investment castings. Until recently he was production manager, Bearing Division, Bohn Aluminum & Brass Corp., Detroit. Previously he was associated with Fruitport Brass & Machine Co., Grand Rapids, and Federal Mogul Corp., Detroit.

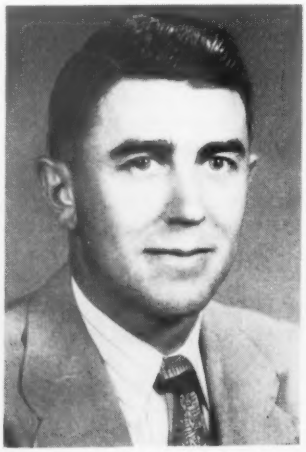
Robert Krogh was appointed sales manager, Ipsen Industries Inc., Rockford, Ill., maker of industrial heat treating furnaces and equipment. Since joining the company in 1950, he has served as sales engineer and district sales manager in Detroit and Cincinnati.

Lloyd L. Stouffer, since 1951 secretary-treasurer, Pangborn Corp., Hagerstown, Md., recently was elected vice president of the company. He joined the company in 1918 and became secretary-assistant treasurer in 1940. **Mrs. Helen R. Fisher** formerly assistant secretary, was named secretary, and **John R. Bell,** assistant treasurer, has become treasurer. Mrs. Fisher and **Thomas B. Butler,** Baltimore, were named new directors of the company.

Gordon L. McMillin, recently appointed assistant vice president, was named vice president, Steel Foundry Division, Canadian Car & Foundry Ltd., Montreal, Que.

Robert Brandt has been appointed New England sales representative, Newaygo Engineering Co., Newaygo, Mich. Prior to organizing the Northeast-Brandt Co. in 1953, he was Con-

HAROLD M. GOWING
. . . joins Electric Steel Foundry

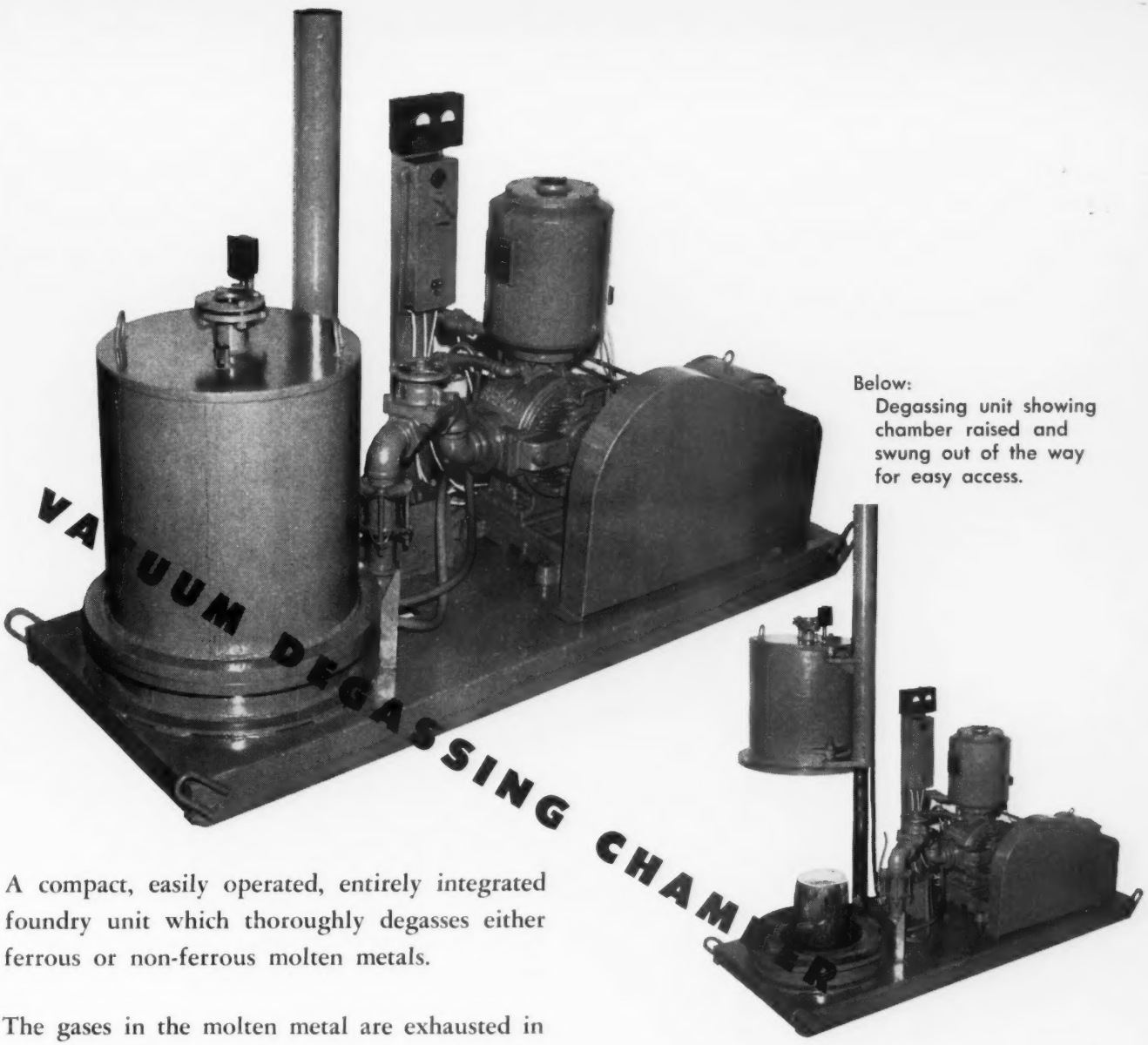


RICHARD J. GREENE
. . . INCO technical section head

ROBERT KROGH
. . . Ipsen Industries sales mgr.

ROBERT BRANDT
. . . New England sales, Newaygo

VACUUM DEGASSING CHAMBER



Below:
Degassing unit showing chamber raised and swung out of the way for easy access.

A compact, easily operated, entirely integrated foundry unit which thoroughly degasses either ferrous or non-ferrous molten metals.

The gases in the molten metal are exhausted in a few minutes, and the metal may be poured from the crucible or ladle.

The CCMCo package unit is complete—requires no process changes—occupies small floor space—needs no special foundation—is easily moved—requires no special experience or training.

Because of the built-in lifting device for the top half of the chamber, no jib crane or other type of overhead handling equipment is necessary for the operation of the chamber itself.

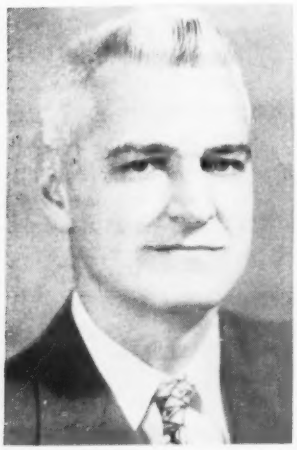
- **Be first with the best. Wire, phone or write for complete illustrated details.**

- **Ruggedly built for foundry service.**
- **Physical properties of resulting castings are enhanced. Rejects and scrap due to gas are practically eliminated. Highest electrical conductivity of copper is insured.**
- **Built-in internal radiation shield reduces heat loss and keeps chamber cool.**
- **Built-in water-cooled filter.**
- **Internal sight-glass shield.**
- **Low in cost, this Vacuum Degassing Unit permits profitable operation from the first day.**

CENTRIFUGAL CASTING MACHINE CO. P. O. Box 947 Tulsa 1, Okla.

necticut and Rhode Island sales representative for Frederic B. Stevens Co., Detroit. An alumnus of Ohio State University, Mr. Brandt was formerly associated with Sargent & Co., New Haven, Conn., Norwalk Lock Co., Norwalk, Conn., and Lufkin Foundry & Machine Co., Lufkin, Tex.

Norbert K. Koebel was named manager of the Heat Treating Furnace Division, Lindberg Engineering Co., Chicago. He will direct an expanded research and development department and will be chief technical advisor to associate companies abroad. A graduate of Ohio State University, he joined Lindberg Engineering Co. in 1940.



NORBERT K. KOEBEL
. . . Lindberg division mgr.

A. J. FRUCHTL
. . . heads Birmingham Chapter

R. J. YOUNG
. . . retires, Dominion Eng. Works

ERNEST NUBER
. . . field sales mgr.

A. J. Fruchtl, named chairman of the Birmingham District Chapter of the AFS for the coming year, since 1949 has been manager of the North Birmingham Pipe Plant, United States Pipe & Foundry Co. Mr. Fruchtl first worked in the maintenance and service departments of Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., and joined U. S. Pipe & Foundry Co. in 1944. He became acting manager of the company's Chattanooga, Tenn., plant, and in 1947 was named assistant to the vice president in charge of operations in Burlington, N. J., the company's general office. Mr. Fruchtl was vice chairman of the Birmingham Chapter last year.

R. Lindley Murray was elected board chairman, Hooker Electrochemical Co., Niagara Falls, N. Y., succeeding **Edwin R. Bartlett,** who resigned as board chairman to become chairman of the company's finance committee. **Bjarne Klaussen,** formerly executive vice president, was elected president of the company. Mr. Murray and Mr. Klaussen had been president and executive vice president, respectively, since 1951.

R. J. Young has retired as assistant superintendent of foundries, Dominion Engineering Works Ltd., Montreal, Que., which he joined in 1948. He will live at 57 Megunticook St., Camden, Me. Educated at Lehigh University, Mr. Young was formerly associated with Taylor-Wharton Iron & Steel Co., High Bridge, N. J., Bethlehem Steel Co., Bethlehem, Pa., U. S. Navy Yard, Philadelphia, and General Alloys Co., Boston. He is a former director and vice chairman of the educational committee of the Eastern Canada Chapter of the AFS.

J. Lyle Thomas was named sales manager, Railway Division, National Malleable & Steel Castings Co., with headquarters in Richmond, Va., succeeding **John R. Kingman,** who is with the company's general offices in Cleveland on special assignment with the division. Mr. Thomas was educated at Virginia Mechanic Institute and John Huntington Polytechnic Institute. He was with the Chesapeake & Ohio Railroad general offices in Richmond until 1953 when he joined National Malleable.

W. F. Krahl has been appointed sales representative in Illinois and Wisconsin for Precision Metalsmiths Inc., Cleveland. For the past two and a half years he was sales engineer in northern Ohio for the company. He has had 15 years of experience as a tool designer and engineer.

Frank B. Stauffer was appointed West Coast representative, Ohio Steel Foundry Co., Lima, O., with headquarters in Oakland, Calif.

Clayton G. Findlay was appointed St. Louis district manager, Electric Controller & Mfg. Co., Cleveland. Mr. Findlay, graduated from Case Institute of Technology, joined the company in 1946. He was a member of the Chicago engineering sales staff the last 8 years.

Ernest Nuber has been appointed general field sales manager, the Bristrol Co., Waterbury, Conn. Mr. Nuber attended Brooklyn Polytechnic Institute and joined the Bristol sales engineering organization in 1929. He became Pacific Coast manager in 1934 and later was appointed export manager. He was named manager of the application engineering department in 1948 and for the past year and a half was sales manager for the company.

Frederick C. Kroft has been appointed general superintendent-manufacturing, Haynes Stellite Co., Kokomo, Ind., division, Union Carbide & Carbon Corp., New York. A graduate of Purdue University, he joined the company in 1936, became a junior research engineer in 1942 and assistant technical director in 1950. Later that year he was made superintendent of the inspection, process and quality control department.

Thomas Trowbridge was appointed assistant general sales manager, Behr-Manning Division, Norton Co., Worcester, Mass. **William J. Bennett** was named sales manager for the division's Eastern region and **Victor F. Perreault** has become industrial trades manager.

H. Dorsey Hammond has been appointed sales manager, Arlington Bronze & Aluminum Corp., and Danko Pattern & Mfg. Co., both of

Memo to foundry superintendents:

Under actual working conditions—that's the best place to test Edco Dowmetal Bottom Boards. For example, fellow foundrymen of yours have come to depend on true castings — and increased scrap savings — when they work with Edco Bottom Boards.

They're light, easy to stack in any small space. We'd like the chance to tell you more. Write for more information . . . and the list of 83 standard Edco sizes in stock—

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Christiansen Corporation

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Edco Dowmetal Bottom Boards · Edco Aluminum Ingot

Baltimore. For 15 years Mr. Hammond was associated with Brake Shoe & Castings Division and Electro-Alloys Division, American Brake Shoe Co., New York. He is a former director of the Chesapeake Chapter of the AFS.

Carl Beers has been appointed Detroit area sales representative, Newaygo Engineering Co., Newaygo, Mich. A graduate of University of Michigan, Mr. Beers has been in the foundry equipment layout and installation field for 23 years. Previously he was associated with Chrysler Corp.'s Dodge Plant and recently was vice president and sales manager of Claude B. Schneible Co., Detroit.

J. James Mudd has been appointed assistant manager of field engineers and sales, the Bellows Co., Akron, O. He joined the company in 1945 as a field engineer and in recent years was Midwest regional manager.

Robert E. Cleland, for the past year Michigan sales manager, Eastern Clay Products Department, International Minerals & Chemical Corp., Chicago, was appointed district sales and service manager for the company's north central district, including eastern Michigan, Canada and upper New York. **Willis W. Woodman,** formerly sales engineer in Indiana and southern Ohio, was named district sales-service manager, south central district, including Indiana, Kentucky, Tennessee, Virginia, Alabama and the Carolinas. He joined the company in 1947 and has been in the Indiana territory since 1952. **Richard A. Green,** formerly sales engineer in Ohio, has become district sales-service manager for northern Ohio and eastern United States. He joined the company in 1950. **Willard L. Adams,** until recently sales engineer in western Michigan, was made district sales-service manager for the Midwest district, including western Michigan, Illinois, Wisconsin, Iowa and Minnesota. He has been with the company since 1952.

J. Paul Maddox, formerly vice president, Laclede Arch Co., Chicago division of Laclede-Christy Co., St. Louis, has been appointed special representative, Refractory Specialties Division, Mexico Refractories Co., Mexico, Mo. He was associated with Laclede-Christy for 23 years as manager of its specialties division, assistant vice president-manager of the general refractories division, until he was made manager of Laclede Arch Co.

Harold C. Cook was appointed purchasing agent, Dodge Division, Chrysler Corp., Detroit, succeeding **John C. Poyner,** who has become assistant general purchasing agent for Chrysler Corp. Mr. Cook joined Chrysler in 1933.

Joseph D. Robertson was appointed sales engineer in Georgia, South Carolina and North Carolina for W. W. Sly Mfg. Co., Cleveland. A graduate of Georgia Institute of Technology, Mr. Robertson was previously associated with A. O. Smith Corp., Milwaukee, and F. J. Stokes Machine Co., Philadelphia. His headquarters will be in Decatur, Ga.

Ralph E. Forsman recently joined Basic Refractories Inc., Cleveland, to handle company sales in the Philadelphia office. During 20 years in the steel industry he was previously associated with Youngstown Sheet & Tube Co., East Chicago, Ind., Pittsburgh Crucible Steel Co., Midland, Pa., and Sharon Steel Co., Lowellville, O.

Walter B. Lawrence, formerly Cincinnati district sales representative, Allis-Chalmers Mfg. Co., Milwaukee, was named manager of the new office recently opened in Columbus, O. He joined the company in 1934.

Keith G. Splude, until recently application engineer, Louis Allis Co., Milwaukee, was appointed division-

CARL BEERS
. . . Newaygo Engineering sales

J. JAMES MUDD
. . . Bellows Co. assistant mgr.

J. PAUL MADDOX
. . . joins Mexico Refractories

KEITH G. SPLUDE
. . . joins Stearns Magnetic

al sales manager of the brake division, Stearns Magnetic Inc., Milwaukee. He is a graduate of Marquette University.

Alan D. Kattelle was appointed assistant general purchasing agent, American Brake Shoe Co., New York. A graduate of Columbia Engineering School, he joined the company in 1948 and worked several of the company's plants until being assigned to purchasing in 1952 at New York headquarters.

Goff Smith has been named executive vice president, Griffin Wheel Co., Chicago, subsidiary of American Steel Foundries. **Roger G. Kimber** succeeds Mr. Smith as manager of railway specialties sales for the parent company.

Frank P. Shonkwiler was named manager of basic sales, Harbison-Walker Refractories Co., Pittsburgh, with headquarters in the Pittsburgh office. A graduate of University of Illinois, he joined the company in 1943.

Albert S. Telkins was appointed Philadelphia district manager, Rotor Tool Co., Cleveland. Mr. Telkins' territory includes southeastern Pennsylvania and northern Delaware.

THE SPANGLER AUTOMATIC LIQUID METER

now exclusive with

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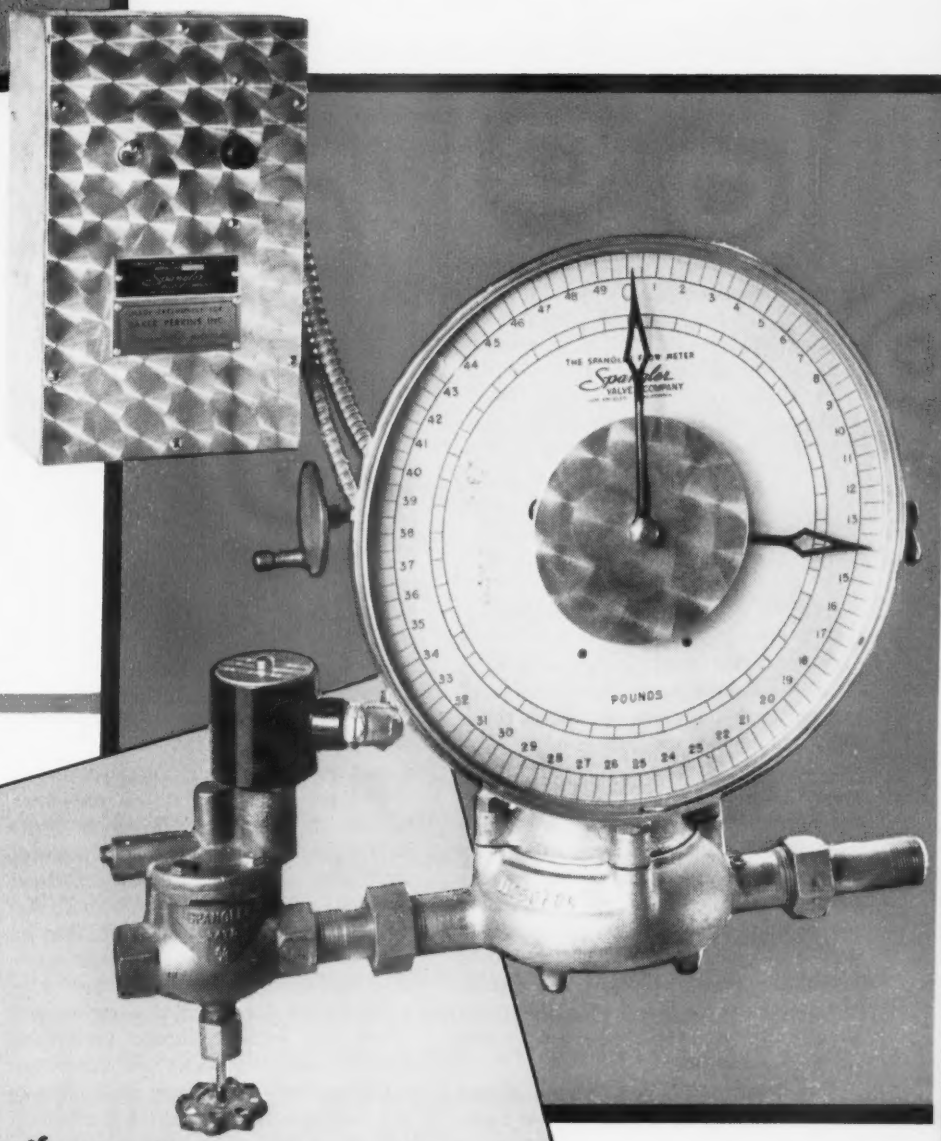
The Spangler automatic liquid metering unit takes the guess work out of your water and oil requirements for batch sand mulling. Good engineering and fine construction make possible exact control of water or oil to Foundry Sand Mixes.



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Delivery volume easily changed.

Dial can be calibrated in gallons or pounds or fractions thereof.

Automatic operation.

Only one moving part.

Very little space required and meets all water control specifications.

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Rising Business Trend Noted at

MALLEABLE FOUNDERS' MEETING

By FRANK G. STEINEBACH
Editor

William A. Kennedy, right, is presented the McCrea Medal by Leon J. Wise for his "outstanding service to the malleable industry"

New president is Carl L. Liebau, president of Federal Malleable Co., West Allis, Wis.

AN ENTIRELY different business atmosphere than prevailed a year ago was reported at the annual meeting of the Malleable Founders' Society held at the Greenbrier, White Sulphur Springs, W. Va., June 15-17. While orders for castings were down in 1954, business in the industry has been improving monthly for some time.

In opening the meeting, Charles E. Brust, president, Eastern Malleable Iron Co., Naugatuck, Conn., and president of the society, indicated that the present high rate of activity may continue through the remainder of the year with anticipated total production being close to 950,000 tons. This would be an increase of approximately 15 per cent over 1954. March shipments at 102,364 tons were the highest in history, and it is possible total shipments for the year may exceed the high record of 1,080,000 tons in 1951. Mr. Brust also reviewed developments in pearlitic malleable casting. He added that it is especially gratifying that the nearly 100,000 tons shipped in 1954 was practically all new business to the malleable industry.

Mr. Brust said the program of the society is divided into these four categories: 1. Voluntary co-operation in such activities as collecting statistics, holding meetings and providing contacts with government agencies. 2. Promoting the product through sales and marketing conferences, business publication advertising and "Malleable Iron Facts." 3. Research and technical projects, visits to member plants and technical papers. 4. Special services, including cost activities, safety program and services of staff members. The program in his opinion is comprehensive and well balanced. Properly executed, it provides members with the services they want at a cost to them which is reasonable.

The president urged the members to see that someone in each plant studies and makes use of the research work and all other services performed by the society. In conclusion, Mr. Brust expressed appreciation for the excellent work of the society committees during the year and suggested that the time is approaching when the society should undertake some basic research. He also emphasized the importance of the industry taking a better look at fundamental economics, including production procedures, estimating, sales and profits.

Carl L. Liebau, president and treasurer, Federal Malleable Co., West Allis, Wis., was elected president of the society. Leon J. Wise, vice president, Chicago Malleable Castings Co., Chicago, was named vice president and Dudley V. Walker, managing director, Eberhard Mfg. Co. Division of Eastern Malleable Iron Co., Cleveland, was re-elected treasurer. Lowell D. Ryan, Cleveland, was re-elected secretary-managing director.

New directors elected recently by the society include: Anthony Haswell, Dayton Malleable Iron Co., Dayton, O.; Gardner Van Duyne, Meeker Foundry Co., Newark, N. J., and Richard E. Whinrey, Link-Belt Co., Indianapolis.

The McCrea medal was presented to William A. Kennedy, supervisor of products, Grinnell Co., Providence, R. I., for "outstanding service to the malleable industry." This annual award is named in honor of Charles H. McCrea, former president, National Malleable & Steel Castings Co., Cleveland. In presenting the award, Leon J. Wise spoke of Mr. Kennedy's exceptional service on behalf of research and technical activities carried on by the society. For many years he has been chairman of or a member of the Technical Council, which has charge of the research program. He has been chairman of the council in recent years when formal projects have been carried on, including those on gating and feeding and on malleable core materials and practice. In addition, Mr. Kennedy has done considerable work on speed of testing, high and low temperature properties and impact testing.

Reports were presented on committee activities. William T. Cole, Canton Malleable Iron Co., Canton, O., reported that the advertising program in business publications had developed over 700 inquiries for information on malleable castings, and that members had purchased a siz-

Scientific Controls and constant research have kept United products out in front and foundries have learned to depend on them not only for high performance but for constant uniformity. More and more critical castings are being demanded—castings that become structural parts in our air fleet, the heart casting of a hydro-electric unit, or corrosion resistant castings to serve the chemical industry. All these are being made with the aid of United's core binders and that's real tribute to the controls we have maintained.

It doesn't just happen. We have to be sure and that means controls that are fool-proof. Some of the features that we are proud of include separate lines from each storage tank, processing kettles mounted on scales so that charging can be done by weight, solenoid valves to protect for pre-set weighing and a print weigh attachment to verify each calculated weight, specially designed kettles that are vapor-proof with automatic recording temperature controls and mixing capacities to accommodate drums or tank cars, and final laboratory controls, with samples from each lot, labeled and retained for a year after making. This is a system that really works. It insures reproduceable qualities in every lot of oil and reproduceable results in the foundry.

Linbond and **Korbond** oils can do a really fine job for you. Write us for a folder that clocks their value and tells about our resin type **Aqua-set** binders.
You will like the performance of your first drum and each succeeding shipment will be the same.

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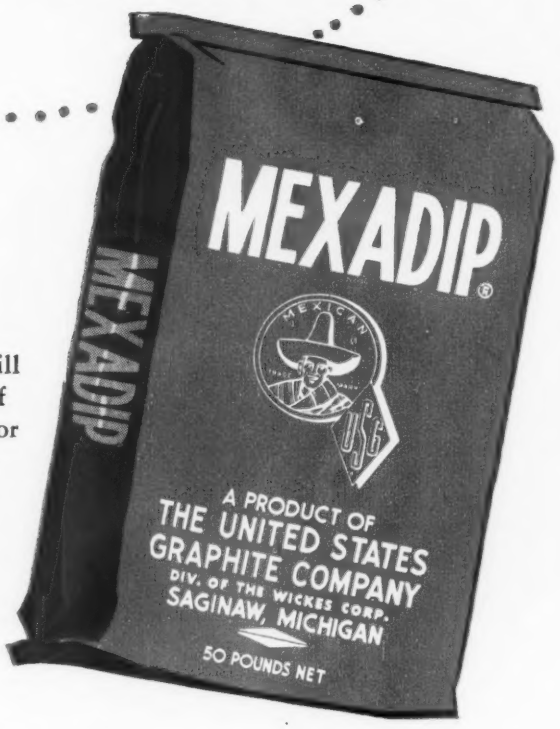
does not ferment!



- **MEXADIP WILL NOT FERMENT.** You will not have to dump your wash because of hot humid conditions—no pock marks or pitted coating surfaces with MEXADIP.
- **MEXADIP STAYS IN SUSPENSION.** Let it stand over the week end, it will be ready to go Monday morning.
- **MEXADIP WILL NOT RUN, BUILD UP OR RUB OFF.** It applies equally well on either green or baked cores.
- **MEXADIP IS DEPENDABLE AT ANY BAUME.** It is applied daily to cores for thousands of tons of castings over a range of 10-40 degrees Baume.
- **MEXADIP REQUIRES NO LONG "PASTE" MIXING.** No waiting period is necessary. Just add the powder to water and after a few minutes of stirring it is ready to go.

IMPROVE CASTING APPEARANCE AND SAVE MAN HOURS IN THE CLEANING ROOM. If you have a problem with core wash, MEXADIP will solve it. Ask us to arrange a test today.

Write for free illustrated Engineering Bulletin No. 17 giving complete information about the complete line of United States Graphite Core and Mold Washes.

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OUR 101ST YEAR

THE UNITED STATES GRAPHITE COMPANY

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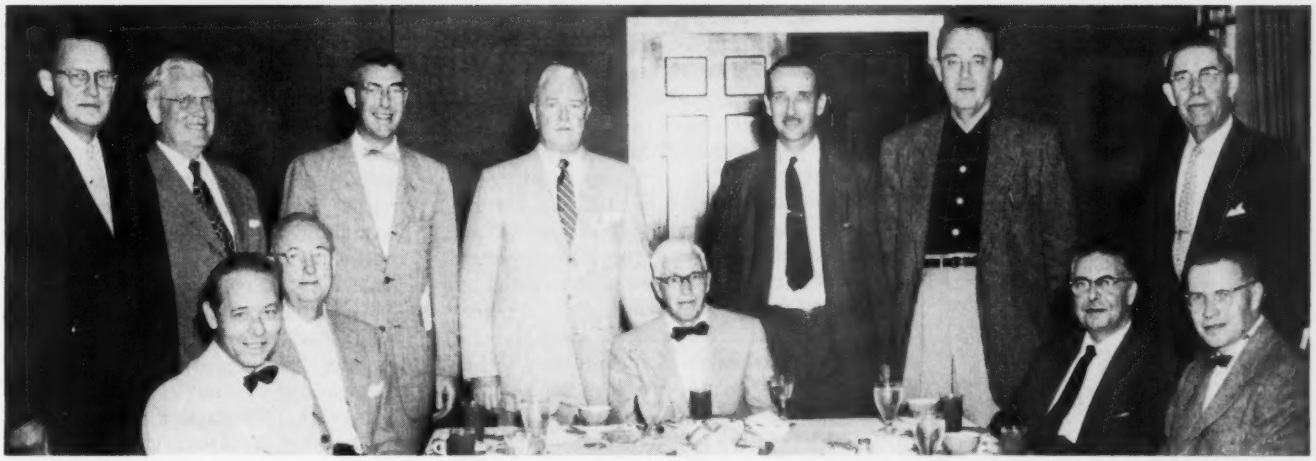

Board of directors: Left to right, standing, Richard E. Whinrey, Charles P. Speitel, Charles M. Brennan Jr., Wilson H. Moriarty, Ross L. Gilmore, George T. Boli and Carl F. LaMarche. Seated, from left to right, are Phillip C. Debruyne, Carl L. Liebau, Charles E. Brust, Leon J. Wise and Gardner Van Duyne

able quantity of reprints of the advertisements.

John Jacobs, Peoria Malleable Castings Co., Peoria, Ill., stated that the Cost Committee has been engaged in an engineering data study of the entire membership and in the development of a supplement to the cost manual covering quantity differentials. The committee will continue the cost accounting meetings during the year. Wilson H. Moriarty, National Malleable & Steel Castings Co., Cleveland, and chairman of the Finance Committee, presented recommendations for by-law changes covering adjustments in dues structure. These were adopted by the membership.

Good progress on the handbook revision was reported by Leon J. Wise. Several sections are completed and others are well along. In contrast with the previous edition, a great deal more attention will be devoted to pearlitic malleable iron, due to the increased importance of that material. Mr. Wise indicated the committee hopes to have the revision completed by the 1956 annual meeting.

The sixth Market Development Conference and two sales clinics highlighted the activities of the Market Development Committee, according to Charles M. Brennan Jr., New Haven Malleable Iron Co., New Haven, Conn. A subcommittee has been active in securing publicity for malleable castings, and this activity will be increased during the coming year.

Reporting for the Personnel and Plant Operations Committee, Thomas J. Lloyd, Albion Malleable Iron Co., Albion, Mich., stated the committee has been concerned with safety promotion, wage and personnel practices, reports, and statistics in the field of human relations. Awards were made to Chain Belt Co., Milwaukee; Milwaukee Malleable & Grey Iron Works, Milwaukee; Oriskany Malleable Iron Co., Oriskany, N. Y.; and Eastern Malleable Iron Co., Wilmington, Del., for improvement in safety. The committee again conducted a safety letter contest and has continued the safety bulletins to members. Two conferences on "leadership" were held.

The Research and Product Improvement Committee, made considerable progress on the gating and feeding research project during the year, according to George J. Behrendt, Eastern Malleable Iron Co., Naugatuck, Conn. Twelve shop practice meetings were held in various parts of the country. The first series was concerned with "Practical Application of Gating and Feeding Research Project" and the second with

The annual banquet of the society was held on the evening of June 16 in the Oriental Room of the Greenbrier. In background is the speakers table

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means
Sand Preparation...

MIX-MULLER means *more* for every mulling dollar!

Thousands of foundrymen have endorsed by ownership, certain basic principles of mulling sand and have written *success* across every design improvement to the Simpson Mix-Muller for over 40 years.

These basic features appeal to foundrymen because they mean more mulling for every dollar invested. Every Mix-Muller improvement to now, and from now on, has been and will be designed to enhance the value of these mulling features:

MORE PROPERLY PREPARED SAND per dollar of cost.

LOWEST OPERATING COST per ton of prepared sand.

WIDE FACE MULLERS *mull* more with every turn.

SIMPLICITY of design means lower maintenance, longer life.

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"Improvements in Shop Practice or Material Use, Making for Cost Reduction." The series just concluded considered "Cause and Control of Scrap Due to Cracks, Tears and Other Sources." The idea of staging a general shop practice meeting in Cleveland is being studied. During the year the society has maintained close contact with those engineering and technical societies interested in engineering materials, and representatives have visited arsenals and Naval Research Laboratories. Other activities include the test bar service, work on product improvement, and consideration of new research projects.

Mr. Kennedy reported that the Technical Council had been concerned with the technical phases of the handbook revision and the furthering of Project II on "Gating and Feeding of Malleable Iron." Through splendid co-operation of a number of member companies, much work has been done on the project, and Part IV dealing with "Further Studies of Factors Affecting Feeder Efficiency" has been published. Mr. Kennedy also reported that arrangements have been made with the United States Bureau of Standards for issuance of a white iron standard sample. Portions of the sample will be available through the bureau in the near future.

James H. Lansing, technical and research director of the society, reported progress on the Welding Committee's investigation of the influence on the properties of malleable iron with particular regard to the evaluation of any embrittlement that might be encountered. Incomplete data indicate the need for some correction in practice before proper appraisement of welding can be made.

Mr. Lansing then discussed in some detail Part IV of the study on "Gating and Feeding of Malleable Iron." The work is divided into ten sections as follows: A—Studies of the Effect of Pouring Temperature on White Iron Shrinkage; B—Studies of Feeder Proportioning for Maximum Feeding Efficiency; C—Study of Gate Location on Feeders; D—Studies of the Effect of Taper on a Casting as an Aid to More Efficient Feeding; E—Further Studies of Gate Size and Shape; F—Studies of Effect of Chill, Chill Size and Location; G—Studies of Multiple Feeders per Casting; H—Confirmation of Curve Established in Part II Report for Single Castings Fed by a Single Side Feeder; I—Application of Gating and Feeding Work to Production Castings; J—Investigations in Process.

Proposed activities for the coming year were outlined by President-elect Liebau. In addition to general society

GANGWAY! BY J. A. PATTERSON

"Don't try to tell me that—I know you're not that near-sighted!"

and section meetings, the shop practice meetings, cost accounting meetings, regional sales clinics and the seventh annual market development conference will be held. A subcommittee will be appointed to promote pearlitic malleable iron, including the preparation of specific articles on the subject. The research project on gating and feeding wil be continued. Greater safety will be stressed, and a special new award will be given for those plants whose average frequency rates for the years 1951-55 are the lowest. The president placed special emphasis on the importance of promotion in furthering the use of malleable iron castings and finding new applications for them.

Lowell D. Ryan, managing director, stressed the importance of exploring definite trends in the future of the malleable iron industry. He pointed out that we live in an era of consumption, that consumption requires marketing and that marketing requires selling and promotion. Mr. Ryan indicated what might happen if the industry could dream and plan and provide research and do a job of marketing that would take full advantage of its potential.

Competition Accompanies Prosperity

While industry appears to have associated a high level of prosperity with freedom from tough competition, Mr. Ryan said it may be a remarkable thing about the present economy that tough competition accompanies prosperity. Today's high costs and the need for a high rate of operation in order to break even again emphasize the importance of these fundamentals: 1. Hire, train and keep still more and better personnel. 2. Promote malleable castings with at least twice as much effort and with a correspondingly higher cost than heretofore. 3. Follow and study and adopt new production techniques and methods just as fast as time permits such steps to be taken.

The meeting closed with a spendid address by Cong. Walter H. Judd entitled "The Trend in World Affairs." Mr. Judd is a member of the Foreign Affairs Committee of the House of Representatives, has spent many years in the Far East and gave members an excellent picture of the problems facing this country in connection with its foreign policy. He stressed time and again that whenever America has stood firm for human freedom, we have been successful. When we have bowed to expediency, we have been unsuccessful. He urged that America continue to support its heritage of freedom and thereby win the conflict that now confronts us.

Protection of Patterns Is Affirmed by Courts

Patterns and Drawings Protected from Piracy

By Albert W. Gray

COURT DECISIONS repeatedly have upheld the right of a designer or inventor to the protection of his patterns. In one such case, the inventor of a rotary pump made a complete set of patterns for castings. Although he freely marketed the pumps, the patterns were kept a secret to prevent the manufacturing of these pumps by competitors.

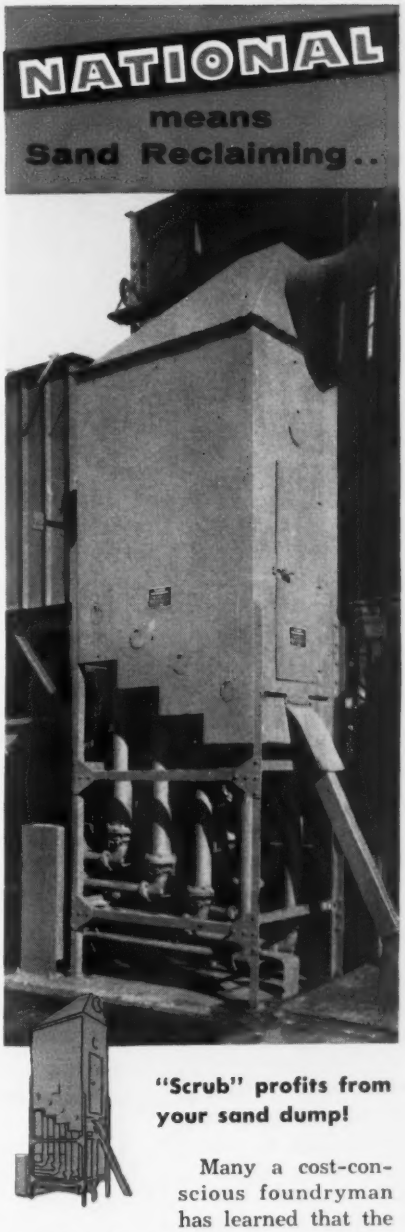
The patterns were taken to a patternmaker for repair, and while he had them in his possession, the patternmaker made a complete duplicate set. The decision in the lawsuit that followed firmly established the right of an inventor or designer to the protection of his patterns or drawings from the piracy of others.

In this decision the court said, "Are not the shape and size of the patterns therefore a secret which the owner has not published and and in which he still has an exclusive property? As more could be learned by measuring the patterns than could be learned by measuring the component parts of the pump, was there not a secret that belonged to the discoverer until he abandoned it by publication or it was fairly discovered by another?

"The fact that one secret can be discovered more easily than another does not affect the principle. If there was a secret it belonged to the owner of these patterns and this competitor had no right to obtain it by unfair means or use it after it was obtained. We think that the patterns were a secret device that was not disclosed by the publication of the pump and that the owner of the patterns was entitled to the preventive remedies of the court."

In another instance of this character blueprints of cars and their parts furnished by a steel car manufacturer to its customers, for aid in determining the type of cars best adapted to their use and for the ordering of repair parts, were appropriated by a competitor.

The court here followed the law laid down in the decision involving the pump patterns. "An inventor," it asserted, "does not lose his rights unless he suffers his invention to go into public use without objection. The exhibition of a blueprint of machinery in the office of a purchaser, although done by permission of the



"Scrub" profits from your sand dump!

Many a cost-conscious foundryman has learned that the road to the sand dump is a two way street—thanks to the National Pneumatic Sand Recovery System.

Thanks too . . . to the vision and confidence of several good customers who helped us to make record of early success, the practicality of the system has proven that dollar saving recovery of "burnt out" sand is now within the reach of foundries—everywhere.

Write today for Bulletin 512 or ask your National man to arrange for you to visit a National Sand Recovery installation in your area.

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NATIONAL
means
Sand Handling . . .

Better castings are our business.

Foundries big and small have taken advantage of the background of practical foundry experience and engineering skill that go into every National sand and mold handling job.

Experience has taught us to look on a molding system as a machine to produce *castings*. The function, operation, service and maintenance of each part must be considered and successfully worked out if the "machine" is to operate efficiently. That's why National offers a *complete* service, not a collection of catalog items. It begins with a thorough analysis and *carries through* to design, manufacture and installation. You get a coordinated unit—a machine to produce castings.

Write today for your free copy of the National Data Book for Engineers.

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manufacturer, a copy of whose drawing it is, certainly is not a general publication and an abandonment of exclusive rights in the drawing."

A few months ago a New York appellate court said this in the decision on an action for an injunction against the use or disclosure of dial telephone equipment designs:

"When the idea comes into the possession of one through special confidential disclosure by the inventor, or under contractual or other legal restrictions, its disclosure may be the breach of a fiduciary trust which the court will restrain, and if there is a profitable use made of it the fiduciary nature of the knowledge acquired may result either in the requirement to account or damages for the invasion of the property right against one who has thus acquired the knowledge and misused the confidence."

References

Tabor v. Hoffman, 23 N.E. 12, New York.
Pressed Steel Car Co. v. Standard Steel Car Co., 60 Atl. 4, Pennsylvania.
Petnel v. American Tel. & Tel. Co., 117 N.Y.S.2d 294, New York.

Steel Founders Move Offices

On Aug. 4, Steel Founders' Society of America will move to 606 Terminal Tower Building, Cleveland 13. The new quarters provide a small increase in floor space and offer greater convenience and improved service facilities. The society's staff is headed by F. Kermit Donaldson, executive vice president; Charles W. Briggs, technical and research director; George K. Dreher, secretary; R. A. Willey, assistant technical and research director, and Erwin Dieckmann, office manager.

Occupational Safety Guide Offers Training Aids

All phases of occupational accident prevention are described in the National Safety Council's 1955 Occupational Safety Services Guide. The 68-page catalog lists Council periodicals, newsletters and a complete library on the topic.

To assist foremen, the service guide offers a monthly magazine, training films that show supervisors how to use basic human traits in building a better safety program, and several hundred five-minute safety talks.

Individual copies of Service Guide 2.1 may be obtained without cost by writing the National Safety Council, 425 North Michigan Ave., Chicago 11.

FEMA ADOPTS CUPOLA STANDARDS

THE Furnaces and Accessories Product Group of the Foundry Equipment Manufacturers Association has adopted a set of standards for the essential details of foundry cupolas. This pertains to 1) air volumes required for the various sizes of cupolas, 2) air inlet diameters and 3) flange drilling dimensions.

Previous to the adoption of these standards, each cupola manufacturer used its own figures, which varied considerably. Such variations would frequently cause inconvenience to the customer that might be selecting new or replacement equipment for his foundry. The Committee on Cupola Standardization, headed by Gordon E. Seavoy, vice president, Whiting Corp., consists of the three leading manufacturers of this type of equipment. In addition to Whiting Corp., Harvey, Ill., this includes Modern Equipment Co., Port Washington, Wis., and Grindle Corp., also of Harvey, Ill.

These new standards are shown in the accompanying table and represent the complete cooperation of these companies.

The blower manufacturers can furnish adapter flanges to conform to these diameters. Also, the air weight controls can be furnished with corresponding component parts to match.

CUPOLAS

Cupola Size	Inside Shell Diam. In.	Diam. Inside of Lining In.	Recommended Blower Capacities Range in CFM (Standard Conditions)	Air Inlet Diam. In.
1	32	23	1000–1050	10
2	36	27	1430–1550	12
2½	41	27	1430–1550	12
3	46	32	2000–2400	14
3½	51	37	2700–3000	14
4	56	42	3450–3780	18
5	63	45	4000–4500	18
6	66	48	4500–5200	20
7	72	54	5750–6875	20
8	78	60	7100–8250	24
9	84	66	8600–9700	24
9½	90	72	10200–11340	24
10	96	78	11900–13000	28
11	102	78	11900–13000	28
12	108	84	13900–15500	28
13	114	90	16100	30
14	120	96	18400	30

FLANGE DRILLING

Inside Diam. of Pipe In.	Diam. of Bolt Circle In.	Number of Bolt Holes	Diam. of Bolt Holes In.
6	7⅞	8	⅝
8	10	8	¾
10	12¼	12	¾
12	14¼	12	¾
14	16¼	12	¾
16	19¼	16	¾
18	21¼	16	¾
20	23⅛	20	¾
24	27¾	20	¾
28	31¾	28	⅞
30	33¾	28	⅞
36	39¾	32	⅞
42	45¾	36	⅞
48	51¾	44	⅞

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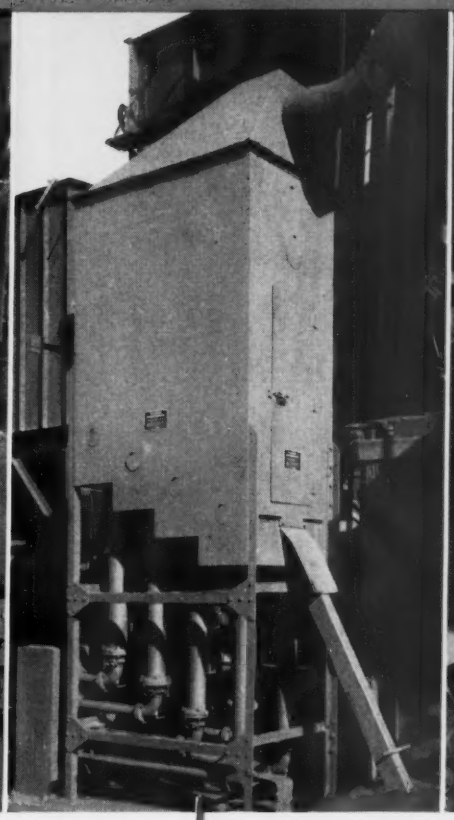
Means Equipment and Service for BETTER Sand Practice



mixing | **reclaiming** | **handling**

SIMPSON MIX-MULLERS
25 to 4000 lb. batch capacity

NATIONAL SAND RECOVERY SYSTEM
Practical pneumatic sand scrubber

NATIONAL HYDRO-FILTER
Wet-type dust collector

SIMPSON PORTO-MULLER
250 lb. capacity (100% portable)

Just as the process of mulling has made possible the use and benefits of synthetic molding sand, so have the efforts of National Engineering Company been continued toward the development of products and practices that help you make better *use* of sand:

• Today's Simpson Mix-Muller has been improved to provide infinite control over muller pressures. Maximum pressures are automatically developed as the sand increases in strength towards the end of the cycle.

• The National Pneumatic Sand Recovery System has made the dry recovery of "burnt out" sand practical — and within the economic and physical reach of most foundries.

• The services of your National Engineer have been broadened through the years to offer practical, experienced assistance in every phase of sand handling, molding and casting practice.

• A subsidiary company, National Dust Collector Corporation, now offers a wet type dust collector that can cite efficiencies of 98.2 to 99.1% in collecting foundry shakeout dust.

These are but a few of the reasons why when you *buy National* you buy products of the practical foundrymen . . . made for the foundry, *by* foundrymen.

If your problem is in sand preparing, sand handling, mold handling or excessive waste sand — call your National engineer today.

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Effective July 1, 1955, International Minerals and Chemical Corporation, Eastern Clay Products Department amended their agency arrangement so that all offices of Hickman-Williams & Company will distribute, sell and service all of their products.

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Contact any HICKMAN-WILLIAMS *office*

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Mathews Completes Building Program and Its 50th Year

Mathews Conveyer Co., with main offices in Ellwood City, Pa., recently combined the celebration of its 50th anniversary with the completion of the broadest expansion program in the company's history.

The building program, which was started in January, 1954 and completed in June, involved a new three-story engineering and office building, entrance to which is shown here, and two major additions to the plant. The latter resulted in some 30 per cent increase in manufacturing area.

The program required 18 months of continuous work and a cost of approximately $1 million.

The engineering and office building, completely modern throughout, has 29,000 square feet of floor space. The first floor houses the executive offices of the company. The second floor contains both proposal and detail engineering departments and the offices of all engineering supervisors. The lower floor level contains elaborate blueprinting equipment, a meeting room, the research department, and is also used for storage of records and materials.

Additions to the manufacturing area involve a complete new truck shipping dock with hydraulically adjustable platforms, a greatly enlarged sheet metal department and area for the assembly of standardized belt conveyers, and a complete new building for the fabrication of heavy power conveyers. Both the new shipping area and the power conveyer assembly departments are equipped with new overhead cranes.

Misco Acquires Standard Alloy

Michigan Steel Casting Co., 1999 Guoin St., Detroit 7, has acquired Standard Alloy Co., Cleveland, and has moved operations, patterns and certain production personnel into the larger plant at Detroit. The Cleveland plant has been sold. Company

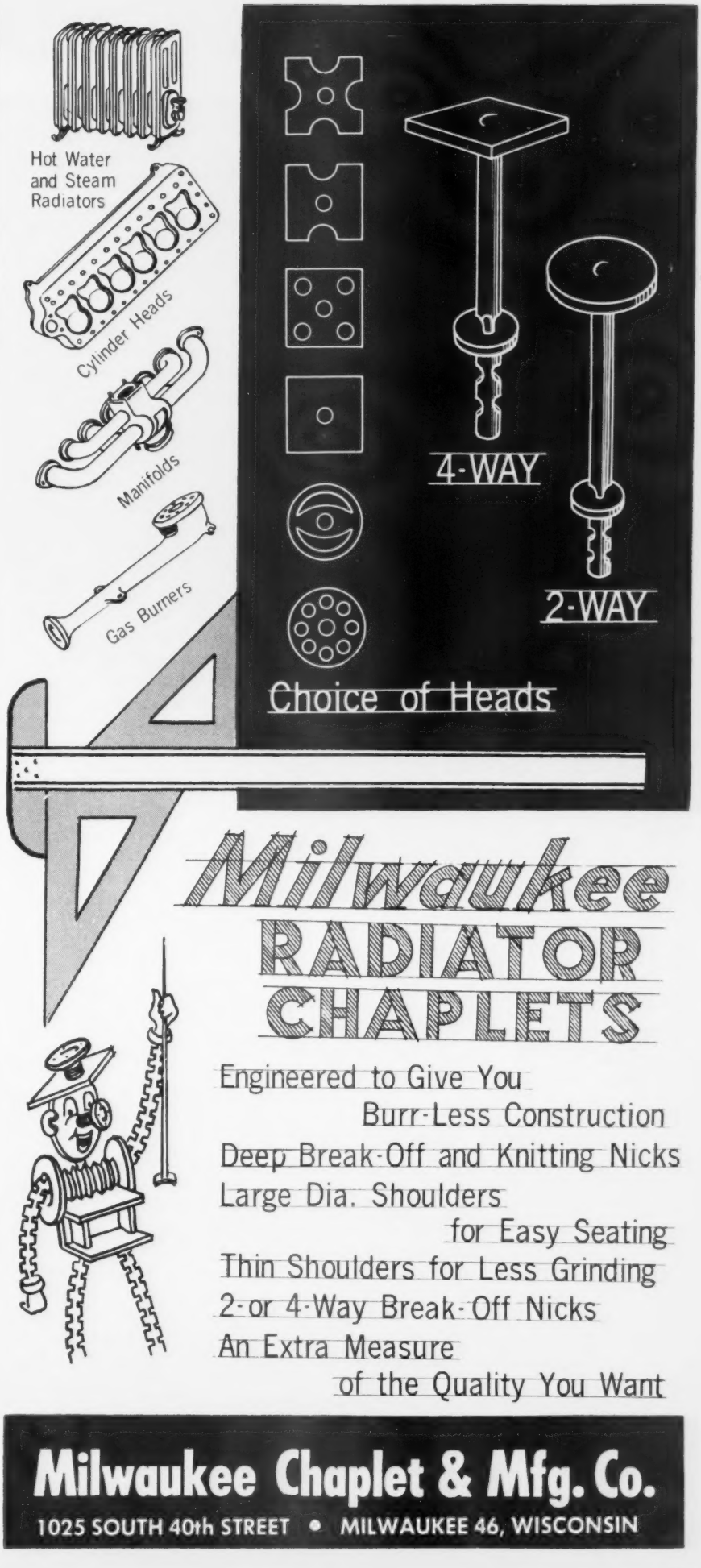
name has been changed to Michigan-Standard Alloy Casting Co. and continues as a division of Consolidated Foundries & Mfg. Corp., Wilmington, Del.

Machinery Products Institute Holds Annual Meeting

At the annual meeting of the Machinery and Allied Products Institute, Chicago, Charles W. Stewart Jr., former secretary and since February executive vice president of the organization, was elected president, succeeding the late William J. Kelly, who was chief executive officer for 18 years. Mr. Stewart also will serve as chairman of the Council for Technological Advancement, affiliate organization of the institute.

Elected vice presidents were Robert W. Gillispie, Jeffrey Mfg. Co., Columbus, O.; Alfred Iddles, Babcock & Wilcox Co., New York; Moorehead Patterson, American Machine & Foundry Co., New York; Guy A. Wainwright, Diamond Chain Co., Indianapolis; and Thomas H. West, Draper Corp., Hopedale, Mass. James D. Vaughan, Alco Products Inc., New York, was re-elected treasurer. Newly-elected members of the executive committee are: Geoffrey G. Beard, United Engineering & Foundry Co., Pittsburgh; Robert C. Becherer, Link-Belt Co., Chicago; R. D. Brizzolara, American Steel Foundries, Chicago; E. C. Bullard, Bullard Co., Bridgeport, Conn.; Benjamin C. Carter, Food Machinery & Chemical Corp., San Jose, Calif.; W. V. Casgrain, Mechanical Handling Systems Inc., Detroit; Robert E. Friend, Nordberg Mfg., Milwaukee; Ralph F. Gow, Norton Co., Worcester, Mass.; S. E. Lauer, York Corp., York, Pa.; Gordon Lefebvre, Cooper-Bessemer Corp., Mount Vernon, O.; Harry C. Moore, Beloit Iron Works, Beloit, Wis.; Bruce F. Olson, Sundstrand Machine Tool Co., Rockford, Ill.; Jerome A. Raterman, Monarch Machine Tool Co., Sidney, O.; Edwin J. Schwanhausser, Worthington Corp., New York; Malcolm D. Shaffner, Saco-Lowell Shops, Boston; Henry D. Sharpe Jr., Brown & Sharpe Mfg. Co., Providence, R. I.; Harold B. Smith, Illinois Tool Works, Chicago; George Spatta, Clark Equipment Co., Buchanan, Mich.; James P. Stewart, DeLaval Steam Turbine Co., Trenton, N. J.; Walter W. Tangeman, Cincinnati Milling Machine Co., Cincinnati; and Brinton Welser, Chain Belt Co., Milwaukee.

Other institute staff officers named at the annual meeting include Alexander Konkle, vice president; George Terborgh, research director; and Charles I. Derr, secretary.



ASTM MEETING IN ATLANTIC CITY

Shows a High Interest in Specifications

By EDWIN BREMER
Metallurgical Editor

FORMING the second largest attendance in the history of the American Society for Testing Materials, over 2500 members and guests participated in 31 technical sessions and over 450 committee and subcommittee meetings at the fifty-eighth annual meeting held at Atlantic City, N. J., June 27 to July 1.

At a luncheon session held on Tuesday newly elected officers of the society were presented. They included the president, C. H. Fellows, Detroit Edison Co., Detroit; vice president, R. T. Kropf, Belding Hemingway Co. Inc., New York, and directors, R. C. Alden, Phillips Petroleum Co., Bartlesville, Okla.; A. A. Bates, Portland Cement Association, Chicago; F. L. LaQue, International Nickel Co. Inc., New York; E. F. Lundeen, Inland Steel Co., Chicago, and J. C. Moore, National Paint, Varnish and Lacquer Association Inc., Washington.

Honorary memberships in the society were presented to R. L. Templin, Aluminum Co. of America, New Kensington, Pa.; Arthur W. Carpenter, B. F. Goodrich Co., Akron, O.; T. A. Boyd, General Motors Corp., Detroit, and W. M. Barr, Los Angeles, Calif. Among the 40-year individual and company members in the society who were recognized were Hyman Bornstein, Moline, Ill.; Paul D. Merica, International Nickel Co., New York; C. F. Kettering, Dayton, O., and Deere & Co., Moline, Ill.

Fourth Gillett Memorial lecture was presented on Tuesday afternoon by Fritz V. Lenel, Rensselaer Polytechnic Institute, Troy, N. Y. His subject was powder metallurgy.

The Marburg lecture was held Wednesday afternoon with W. J. Hamburger, Fabric Research Laboratories Inc., Boston, as the speaker. He discussed "A Technology for the Analysis, Design and Use of Textile Structures as Engineering Materials." Following his talk the Richard L. Templin award was presented to M. S. Hunter and W. G. Fricke Jr., Aluminum Co. of America, New Kensington, Pa., for their paper on "Metallographic Aspects of Fatigue Behavior of Aluminum."

In addition to technical sessions on metals and other materials, several symposiums were featured. One occupying two sessions was on impact testing. Another was concerned with high-purity water corrosion. Others related to corrosion of nonferrous metals, and metals for high temperature service. Committee activities of foundry interest follow:

Committee A-1 on Steel revised tentative specifications for Ferritic Steel Castings for Pressure Containing Parts Suitable for Low Temperature Service (A352-52T)—with reference to impact testing temperatures. It recommended for adoption as standard the tentatives Mild to Medium Strength Carbon Steel Castings for General Application (A27-52T), High Strength Steel Castings for Structural Purposes (A148-50T), and Alloy Steel Castings for Pressure Containing Parts Suitable for High Temperature Service (A217-49T). The committee also proposed a new Tentative Specification for Alloy Steel Castings Normalized and Drawn for High Pressure and Elevated Temperature Service.

Committee A-3 on Cast Iron recommended revised Tentative Specifications for Foundry Pig Iron (A43-49T) (SEE FOUNDRY DATA SHEET, page 231), Tentative Specifications for Chilled and White Iron Castings (A360-52T), and Tentative Methods of Chill Testing of Cast Iron (A367-53T). Also the committee recommended for advancement to standard of Tentative Specifications for Automotive Gray Iron Castings (A159-49T), and Tentative Specifications for Nodular Iron Castings (A339-51T).

Committee also is progressing on its work on tests relative to stress relief procedure and inspection for Standard Specificatons for Gray Iron Castings for Pressure Containing Parts for Temperatures up to 650°F (A278-53). It also has under consideration proposed tentative specifications for Cast Nodular Iron for Pressure Containing Parts for Temperatures Ranging from Minus 20°F to Elevated Temperatures, and for High Strength Nodular Iron Castings.

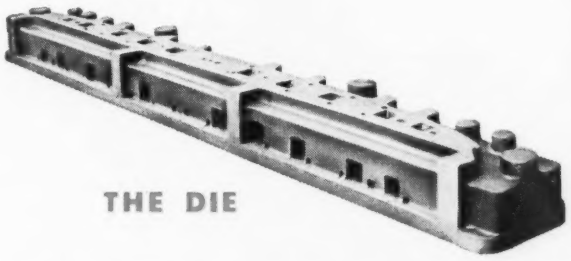
Committee A-7 on Malleable Iron Castings recommended revisions in Standard Specifications for Pearlitic Malleable Iron Castings (A220-50) and reversion to tentative status. Present tentative contains six grades only one of which is the same as in the old standard. Grades are 45010, 45007, 48004, 50007, 60003, and 80002 in which the first two numbers indicate minimum yield strength in 1000 psi, and the last number the minimum elongation in 2 in.

Committee A-10 on Iron-Chromium, Iron Chromium-Nickel and Related Alloys developed a new Recommended Practice for Acidified Copper Sulphate Test for Intergranular Attack in Austenitic Stainless Steels for publication as tentative. Committee also recommended for adoption as standard without change Tentative Specifications for Corrosion-Resistant Iron-Chromium and Iron-Chromium-Nickel Alloy Castings for General Application (A296-49T), and Tentative Specifications for Heat-Resistant Iron-Chromium and Iron-Chromium-Nickel Alloy Castings for General Application (A297-49T).

Committee B-2 on Nonferrous Metals and Alloys recommended revisions in Tentative Specifications for Fire-Refined Casting Copper (B72-47T). Committee B-7 on Light-Metals and Alloys, Cast and Wrought recommended revisions in the following tentative specifications for Aluminum-Base Alloy Sand Castings (B26-54T), Magnesium-Base Alloy Sand Castings (B80-54T), Magnesium-Base Alloys in Ingot Form for Sand Castings, Die Castings and Permanent Mold Castings (B93-52T), Aluminum-Base Alloy Permanent Mold Castings (B108-54T), and Magnesium-Base Alloy Permanent Mold Castings (B199-54T).

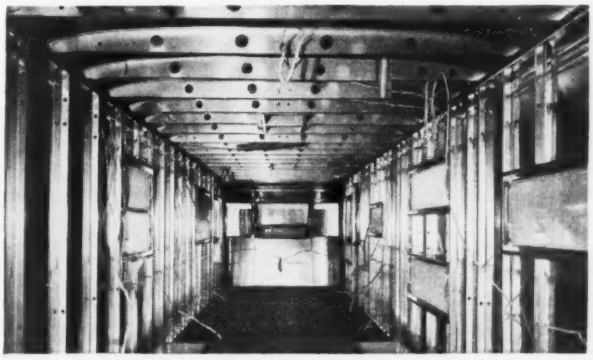
Committee E-7 on Non-Destructive Testing recommended for publication as tentative a Proposed Method for Dry Powder Magnetic Particle Inspection. Committee E-1 on methods of testing suggested for publication tentative methods of test for Young's Modulus at Room Temperature, and Indentation Hardness of Metallic Materials by Means of Portable Hardness Testers. Committee also recommended revisions in tentative methods of Verification of Testing Machines (E4-50T), and Verification of Calibration Devices for Verifying Testing Machines (E74-50T). Standard Methods of Test for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials (E18-54) was revised and reverted to tentative status.

AT NEMCO FOUNDRY: ANOTHER PROBLEM SOLVED BY CITIES SERVICE CORE OIL



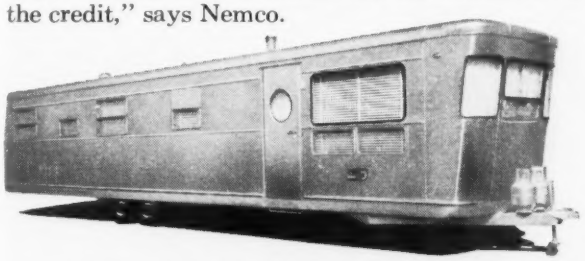
THE DIE

The die pictured here was cast at Nemco Foundry for use by the Spartan Aircraft Company in producing roof ribs for its Spartan Mobile Home. Difficult to produce, it required 10 cores 2⅝″ x 2⅝″ square and 25 cores, quarter-circle in shape, from ¾″ to 1″ in diameter. Semi-circular shape was necessary to core curved slots from top of die to sides. Holes had to be clean and free from obstruction, allowing stamped slugs to fall through. Nemco relied on Cities Service Delco Core Oil to help meet exact specifications. "A smart choice," says J. A. Dean, General Manager. "Delco Core Oil made the job far easier."



THE ROOF RIBS

The roof ribs of this Spartan trailer, cast from the die produced at Nemco, are visual proof of a job well done. "The great strength and high collapsibility of Cities Service Delco Core Oil share a lot of the credit," says Nemco.



THE FINISHED PRODUCT

The finished product is this handsome Spartan Mobile Home awaiting shipment to consumer. Spartan's rigid specifications help make it one of the safest and best on the market.

Difficult casting of die to form roof ribs for Spartan Mobile Home made easier by Cities Service Delco #36

Located in Tulsa, Oklahoma, Nemco Foundry enjoys attacking the really tough jobs and making them easier. And often helping to spearhead the attack is Cities Service, as described here by J. A. Dean, General Manager:

"Recently Cities Service Delco #36 Core Oil again solved a tough job for us in fulfilling the requirements for a casting for the Spartan Aircraft Company, makers of Spartan Mobile Homes. The casting was a bottom shoe for blanking die to make roof ribs for the all-aluminum shells for Spartan trailers.

"The die was of Nemcoloy, Type AL, an alloyed grey iron. It was 106″ long, 8″ thick and 13½″ wide, and weighed 2,018 lbs. cleaned.

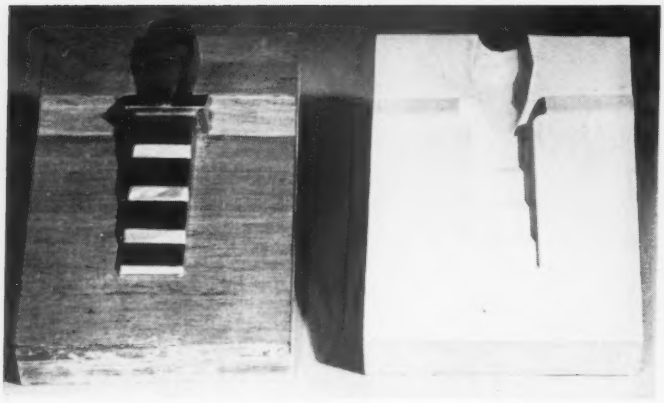
"It required 10 cores 2⅝″ x 2⅝″ square. In addition, it demanded 25 cores, quarter-circle in shape, ranging from ¾″ to 1″ in diameter. Semi-circular design was necessary in order to core curved slots from the top of the die to the sides of the die. Holes had to be clean and free of obstructions allowing the stamped slugs to fall through the die to the outside and not hang up.

"Cities Service Delco #36 Core Oil enabled us to meet these requirements perfectly. We certainly recommend it where great strength and high collapsibility are needed."

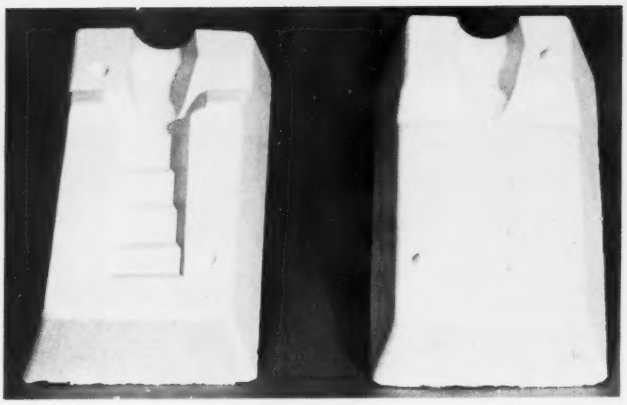
Like Nemco, scores of other foundries have reported unusual results with problem-solving Cities Service Core Oils. Nor does the praise end with the product . . . for time and again the solution for the proper core oil has resulted from the knowledge, understanding and experience of a Cities Service Lubrication Engineer. If you have a lubrication problem, why not talk it over with one of these Cities Service experts? Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS



Model of proposed casting and dense plaster pattern



Halves of a mold made from silica glass powder

Making Precision Castings in GLASS MOLDS

Mold is preheated to desired temperature for 10 minutes, then is poured

DEVELOPMENT of a fast economical method for the precision casting of metals through use of glass molds is announced by Corning Glass Works, Corning, N. Y.

The Corning Glascast process is designed especially for work with high-temperature alloys in providing excellent casting surface finish and close dimensional control. Because molds can be used at extremely high temperatures, design of fine detail and close regulation of metallurgical structure is possible.

In the test production of items such as jet engine buckets and vanes, 90 per cent of the finished castings are said to have met precision standards on surface finish.

The mold powder is essentially a 96 per cent pure silica glass which is mixed with water to produce a casting slip. Poured into a porous plaster form, the slip builds up into a shell which is dried, removed from the plaster and fired. The mold is then ready for use without further treatment.

Castings produced by the process are said to have blemish-free surfaces of better than 40 micro-inch finish. The mold material has high chemical stability and does not react with the metal or its oxides to cause surface imperfections. Accurate control of grain size is thus possible even at metal pouring temperatures as high as 3200° F.

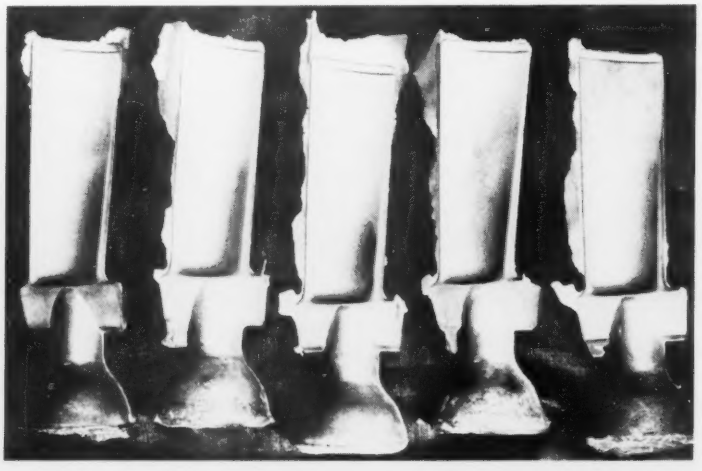
Close dimensional control is aided by the powder's extremely low thermal expansion. Tolerances of ± 0.005-in. per in. can be obtained readily, it is claimed.

The material has excellent resistance to thermal shock and molds can be fired without danger of cracking (hot shells reportedly will not crack even when held under a stream of cold water).

Low tool-up costs make short runs

Pouring porous plaster slurry over dense plaster pattern. A mold will make from 10 to 15 shells

Ninety per cent of such items as these lightly sand blasted jet engine buckets meet precision standards



This hard, spherical, non-metallic mineral shot, impinging on castings, cleans with ONLY ONE PASS over the work without pitting or abrading the surface. The result is a fine, bright finish, free of grime, sand, scale and rust. And being chemically inert and non-absorptive, MONO-KLEEN does not contribute to corrosion and rust. It is clean to use, also . . . does not dust to cause foundry haze, impair workers' vision, or present a respiratory hazard. Let the Baldwin-Hill man show you how you can get cleaner castings and higher production.

GET THE FACTS in this bulletin. Find out how MONO-KLEEN can serve you . . . help solve your blast cleaning problems economically.

BH

BALDWIN-HILL COMPANY

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CESCO RIGHT... before your Eyes!

Approved HEALTHGUARD ABRASIVE MASK used under DURATEX HOOD for complete sand blast protection

BM Approval No. 1918

Features—

- Soft, moulded rubber facepiece
- Exclusive head harness and buckle design
- Flexible lead-in hose
- Low operating pressures
- Constant controlled air circulation
- Replaceable filter cartridge
- Automatic pressure relief valve
- One-way exhaust valve
- Duratex hood with guarded safety glass

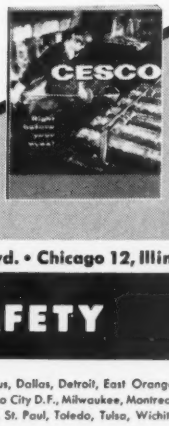
CESCO No. 602

Maximum Wearing Comfort

• The soft, moulded rubber facepiece of the CESCO No. 602 mask makes a comfortable, leak-proof fit. Once head harness is adjusted to fit, mask can be slipped off and on without readjustment. Flexible lead-in hose allows free movement of head.

Uses—The CESCO No. 602 mask with Duratex hood gives complete protection against sand, shot, and grit in foundries, steel mills, and refineries. Its utility adapts it for use in shops doing sand blasting and metallizing. Workers produce more when equipped with a CESCO No. 602.

SEE *your* CESCO *Safety Equipment distributor*
TODAY *or write us for details*



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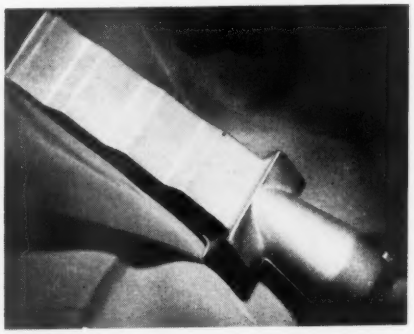
CESCO FOR SAFETY

OFFICES IN: Atlanta, Birmingham, Boston, Buffalo, Cincinnati, Cleveland, Columbus, Dallas, Detroit, East Orange, Houston, Indianapolis, Kansas City, Knoxville, Little Rock, Los Angeles, Louisville, Mexico City D.F., Milwaukee, Montreal, Peoria, Philadelphia, Pittsburgh, Salt Lake City, San Francisco, Spokane, St. Louis, St. Paul, Toledo, Tulsa, Wichita

possible and shop hold-up time from mold preparation to actual casting is greatly reduced. The process is suitable for any of the conventional casting methods (static, pressure, centrifugal, vacuum) used in working with metals such as aluminum, brass, carbon steels, stainless steels, cobalt-base alloys and chromium-base alloys.

Fabrication of the molds requires a minimum of equipment and material. Standard equipment includes a model, containers for slurry, scales, a mechanical mixer, drying oven with temperature control between 105° and 300° F, and a firing furnace with temperature range up to 2000° F. Materials consist of Glascast powder, dense plaster, porous plaster, parting compound and water.



Casting from a glass mold

The casting model may be any machinable material which can be given a high finish and will meet dimensional requirements. The model is embedded in a profile plate incorporating the desired gating, risering and parting line. Parting compound is applied and dense plaster slurry is poured into the mold box and allowed to set.

From this pattern, working porous plaster molds are formed. A parting compound of Bayberry wax and gasoline mixture is recommended for application to the pattern. The porous plaster mold is poured, allowed to set and dried between 125° and 140° F to avoid calcination and cracking. The finished plaster mold will make from 15 to 20 Glascast shells before surface and dimensional deterioration.

Slip for the Glascast mold is then prepared by measuring four parts by weight of powder with one part water. A 10-lb batch can be mixed with a high-speed mixer in an hour by feeding the powder into the water gradually, or the slurry can be mixed in stoppered bottles on rollers. The slip will last indefinitely as long as it is agitated constantly.

The slip is poured into the porous plaster mold and allowed to stand from 5 to 10 minutes until enough water has been absorbed to build up

a shell of glass solids to the desired thickness. Excess liquid slip is drained off for reuse and the glass shell is dried for 15 minutes at 140° F. After removal from the plaster form, the shell is oven-dried at 200° F and then fired for half an hour between 1740° and 1920° F, depending on the strength desired. The shell is then ready for immediate casting or for storage.

In the actual casting process, the shell assembly can be wired or taped together and backed by loose sand, metal shot or any granular refractory material. Or it may be held in place with wire or refractory cement. The mold is preheated to the desired temperature for 10 minutes and is then ready for casting.

Under development for the past three years, the process has been tested successfully in commercial production. Assistance in the program has been given by the Massachusetts Institute of Technology, the Engineered Precision Casting Co. and others.

Issue Tungsten Arc-Welding Electrode Specifications

A specification covering "Tungsten Arc-Welding Electrodes" has been issued by the American Welding Society and the American Society for Testing Materials. Completion of the specification (AWS A5.12-55T) makes possible standardization of nonconsumable-type electrodes used for inert-gas metal-arc welding and for atomic hydrogen welding.

This specification is available for 40 cents per copy from the American Welding Society, 33 West 39th St., New York 10.

Book Review

Applied Thermodynamics, by Earle B. Norris, Eric Therkelsen and Clarence E. Trent, cloth, 490 pages, 6 x 9 in., published by McGraw-Hill Book Co., 330 West 42nd St., New York 36. Price $7.50.

Purpose of the text is to develop an understanding of the fundamentals of thermodynamics as applied to power generation from heat sources. Dual-fuel diesel engines, gas turbines for stationary and locomotive power and for jet propulsion, nuclear power as a development of the near future, and compressors, both displacement and kinetic types, are given considerable treatment. Selected illustrations from current practice are offered with the descriptive text restricted largely to the thermodynamic significance of each piece of apparatus in the economic analysis of the power plant of which it may be a part.

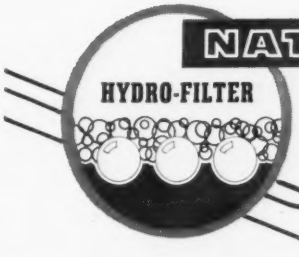
Here's a Dust Collector that cleans itself!
These exclusive features make the new Hydro-Filter virtually self cleaning... can make maintenance a matter of minutes a month:
NO MOVING PARTS
. . . to wear or corrode within collection area.
NO INTRICATE PARTS
. . . to clean. Water action and glass spheres do the work!
SLUDGE CONVEYOR
. . . lifts out. Works at slow speed for top dewatering action.
NO DEAD AREAS
Entire interior is constantly flushed. Every inch is active to collect dust!

New HYDRO-FILTER maintains constant efficiency because it's easy to maintain!

Ease of maintenance and constant efficiency go hand in hand with the new Hydro-Filter to give you your money's worth in *constant* service at rated capacity.

Air, water and glass spheres do the work in the Hydro-Filter. There are no parts within the collection area to corrode or erode . . . nothing to wear or "load up" requiring hours of painstaking maintenance. Continual flushing of the filter bed and automatic sludge removal make it self-cleaning on a "round the clock" basis. A constant automatic, air-water balance assures effective, thorough dust removal through a wide variation in volume and velocity of flow . . . your *answer* to maintenance-free wet collection down to the micron range.

Write for Bulletin 55
Describing the unique filtering principle which makes constant flow wet collection possible with the National Hydro-Filter



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600 Machinery Hall Bldg.,
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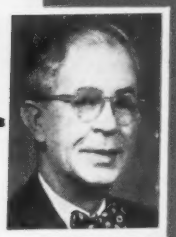
Subsidiary of National Engineering Company, Manufacturer of Simpson Mix-Mullers.



Man to Man

By RALPH L. LEE

A Turn on the Night Shift

"It might not be a bad idea, every once in a while, to examine with a critical eye routines we take for granted and carry on automatically"

I'VE BEEN WORKING on the night shift in the sand lab of a great big foundry—that is, for just one night. I haven't deserted the Lee Hobby Foundry by any means.

For quite some time now I have been experimenting with an idea for measuring the ability of rammed sand in a mold to resist the bursting pressure of a column of liquid metal and how much the sand will give before it bursts. It's been a lot of fun, and I'm getting rather excited over the accuracy with which I can duplicate my tests and the speed with which they can be made.

John Linabury, who recently retired as foundry consultant for General Motors, is one of my closest friends and one of the pioneers in the mechanization of the foundry. He has been following this development since the very beginning, and some time ago he thought it might be a good idea if I would take my apparatus to a big production foundry and trail along with the sand lab boys while they made their routine tests. He was interested in seeing how my method would stack up along side of theirs. In fact, he made arrangements for the project.

I was happy to find that I had friends all over this foundry and that everybody and his uncle did his best to make me feel welcome—going overboard to help me get set up. At regular intervals the boys dashed down into the foundry from the loft and came back with samples. Then we'd hop to it, and, believe me, I did have to hop to it trying to keep up with them. They had lots of practice, and I was all thumbs from the lack of it. Not only that, but bosses from all over the plant came up to say hello and see what the heck I was up to.

Between each test we'd compare notes and talk the ways of sand to a fare-thee-well. I couldn't help think that it's one thing to read about foundry operations and theorize about them and another to chat and work with the boys on location, actually running the operations.

The boss of the lab had the boys put my findings down on their forms along side of theirs, and I did likewise, making it almost a game and raising some very interesting questions when differences and inconsistencies showed up. Taking everything into consideration, my test showed considerable promise as the night wore on. I must say, however, that as interesting as it was, I was good and ready to call it a night when the whistle blew.

Chatting with the bosses of the lab and the foundry before I left, I said, "Now look, suppose that one of these tests shows that a particular specimen has dipped dangerously low in strength (none had all evening). What do you do, blow a whistle or dash on down into the foundry waving a red flag?"

They both laughed and said that an emergency like that rarely, if ever, happened, and any way, the boys down on the line would probably get onto the situation before any great damage was done.

"How?" I asked.

"At the slightest suspicion of trouble, they'd check the sand with the old-time, honored hand-squeeze test," he answered.

"Well I'll be doggoned!" I said. "Now here, let me ask you this. How long after a particular bit of sand's going into a mold would it take for a specimen of it (on a routine basis, that is) to be gathered up, toted off to the lab, processed, recorded and the news of the findings brought back to the boys making the molds?"

They didn't know offhand, never having stopped to figure it out, but in keeping with the regular routine they imagined it would take at least an hour and maybe more. I couldn't help but comment that one whale of a lot of castings could come off any one of the lines during that hour, considering the rate at which they were traveling. They agreed with me, but told me not to forget the watchdogs with their very sensitive and experienced hands.

"Well, then," I went on, "in spite of this wonderfully well equipped sand lab (and they had everything I had ever heard of or read about), the old-fashioned hand-squeeze and roll test used by our grandfathers still remains the front-line guard against molding sand trouble."

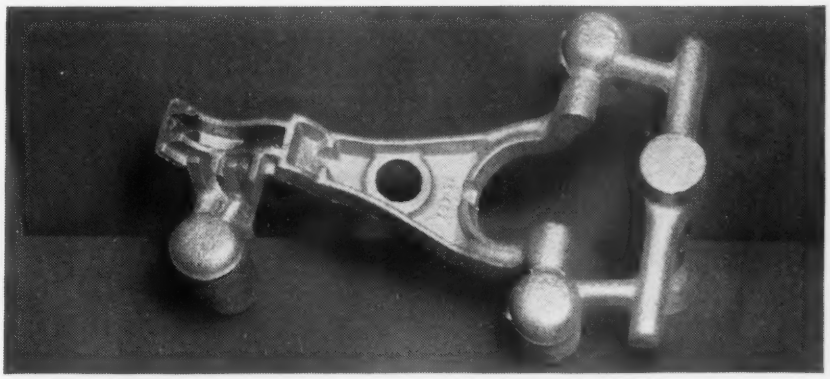
"That's just about it," they both agreed.

They both went on to explain, however, that they kept permanent and running records of the different sand systems, identifying specific castings with the sand they were made in to which they could refer at any time. When FBIing some unusual trouble which didn't show up until final inspection or after machining, they could go back to the records and hold a pow-wow. Then, too, they explained, the sand testing routine and the records down in black and white served as sort of an inspection report to keep the boys responsible for sand toeing the mark.

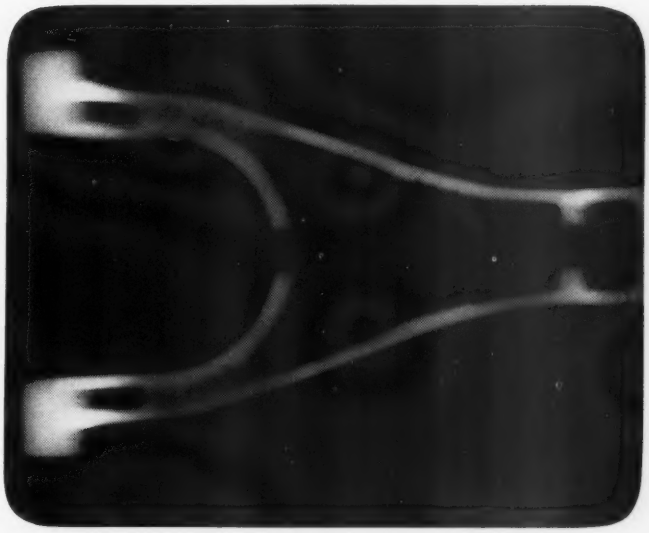
They also pointed out that their lab was darned important when they did research for improving their sand, changing the mix or the sand supply or for some further reason or other. I assured them that I was sold clear up to the eyebrows on sand testing procedures and that was why I spent so much of my time studying and experimenting with them.

I don't know when I have had such an interesting and instructive nine hours (I got there one hour early to set up and get acquainted). I learned a great deal about my experiment and what needs to be done to it, but I learned a great deal more about the role of sand testing in a

Shrink steals strength — and profits



— RADIOGRAPHY points the way to avoid it



THIS steel fork lever was designed to take a specific load. Would it hold up? Not if shrinkage had robbed its strength.

But here is where radiography came in with double-barreled effect. First the radiographs which were made showed the foundryman that internal shrinkage was present. Then the radiographs disclosed a recurring pattern of these defects, thus suggesting a change in molding which greatly reduced the difficulty.

This is typical of the ways radiography helps the foundryman make sure only satisfactory work is delivered and so builds a reputation for high-quality castings.

If you'd like to know how it can improve your own operations, talk it over with your x-ray dealer. Or, if you like, write us for a free copy of "Radiography as a Foundry Tool."

EASTMAN KODAK COMPANY, X-RAY DIVISION, ROCHESTER 4, N. Y.

Radiography

— another important example of Photography at Work

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ACCO's Great New Chain...

ACCOLOY X-WELD 125

• *At last*—a chain with welds as strong or stronger than the material . . . welds that won't break when links are bent sharply . . . welds made with two projecting lugs that absolutely prevent dangerous kinking of the chain . . . welds that provide 2¼ times the welded area found in normal flash or butt-welded links. **Accoloy X-Weld 125** Chains hang straight as a die. Every link is perfectly formed!

Accoloy X-Weld 125 Chain has almost countless uses: Slings, bundling, towing, general utility chains . . . It can be furnished in special analyses and heat treatments to provide greatly extended life and use on **tough jobs** . . . corrosive jobs . . . abrasive jobs . . . hot jobs. Specify **Accoloy X-Weld 125** for your next chain job for a new concept of chain performance, economy and value. Available in ¼", ⅜", ½", ⅝" and ¾" sizes.

• *Ask our nearest district office for further information on* ACCOLOY X-WELD 125 CHAIN, *or write the American Chain Division, York, Pa., for descriptive bulletin.*

PATENT APPLIED FOR

The Secret is in the Weld!

This Accoloy X-Weld 125 link was ground and etched to show its big welded area —2¼ times the size of welded area possible with other welding processes. This means more than double the security at the weld—and only X-Weld has it!

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production foundry. Just how widespread the hand-squeeze sand test serves as the front-line guard of molding operations, I have no way of knowing accurately. It's used a lot, I feel pretty sure.

Neither do I know how accurate it is for moisture, strength or toughness. If it is used quite generally, it certainly would be interesting to find out some time how close an experienced hand squeezer can come to the best of lab tests on the same sand. Without bragging, I think I could do pretty well, provided the lab tests were accurate.

One thing I do know, and I learned it in the Lee Hobby Foundry: If you get your sand testing setup too far away from your molding setup and there's too much time lost trying to work them together, they'll go their separate ways, no matter how many rules you make. The moisture, tensile and toughness test is practically within arm's reach of the molding setup in the Lee Hobby Foundry, and, by heck, they're used.

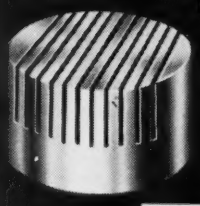
It strikes me that it might not be a bad idea, every once in a while, to examine with a critical eye the routines and rituals we take for granted and carry on automatically, together with the reams and reams of paper forms filled in and filed away for posterity. After all we're not running a lodge. We're making castings, and everything we do in a foundry should pay off some way or another in castings. As the old amateur, I think there's a lot to be done in the direction of bringing theory closer to practice and vice versa. I'm going to work to that end, so help me.

Alloy Casting Institute Holds Annual Meeting

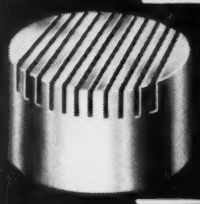
Fifteenth annual meeting of the Alloy Casting Institute was held June 26-28 at the Homestead, Hot Springs, Va. During the three-day meeting, reports on the organization's research work on cast heat-resistant and corrosion-resistant alloys were presented. Most of this research is conducted at Battelle Memorial Institute and Ohio State University, both of which are located in Columbus, O.

Thomas Rutherford, Midvale Co., Philadelphia, was elected president of ACI, succeeding C. K. Lockwood, vice president, Stainless Steel & Alloys Division, Shawinigan Chemicals Ltd., Montreal. The newly elected president, Mr. Rutherford, is a native of Philadelphia and a graduate of Lafayette College, Easton, Pa. He joined Midvale in 1916. Bradley B. Evans

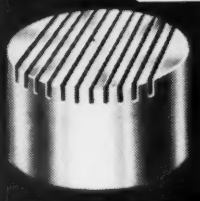
CORE BOX VENTS
"A Specific Type for Every Core Box"



SLOTTED
X-TRA DEEP HEAD .156
Wide Slots .014



DEEP HEAD .093
Wide or Narrow Slots
.014 .010



SHALLOW HEAD .031
Wide or Narrow Slots
.014 .010

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DRILL INSERTING
• MOST ECONOMICAL METHOD for INSERTING CORE VENTS
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Empire Steel Castings Inc., Reading, Pa., succeeds Mr. Rutherford as vice president. E. A. Schoefer, Mineola, N. Y., continues as executive vice president and treasurer.

Two new members were named to the institute's board of directors. They are H. J. Cooper, Cooper Alloy Foundry Co., Hillside, N. J.; and F. M. Fahrenwald, Fahralloy Co., Harvey, Ill.

New York University Offers Public Service Courses

New York University has announced public service courses in accident and fire prevention to be offered in the fall term. Of interest to the foundry industry, beginning on the dates mentioned, are the following: **Accident Prevention—Its Background, Objectives and Relationships,** Sept. 26; **Philosophy and Basic Principle of Accident Prevention,** Sept. 26; **Industrial Hazards—Mechanical and Personal: Control Methods,** Sept. 27; **Fire Prevention and Protection Inspection,** Sept. 29; **Accident Prevention for Operators of Motor Vehicle Fleets,** Sept. 28; **Vision Improvement in Industrial and Motor Vehicle Operators,** Sept. 28; **Principles of Safety Inspection,** Sept. 27; **and Industrial Safety Technology and Instrumentation,** Sept. 30.

Bulletins describing the courses and giving information about fees and registration may be secured from Dr. Walter A. Cutter, Center for Safety Education, Division of General Education, New York University, New York 3.

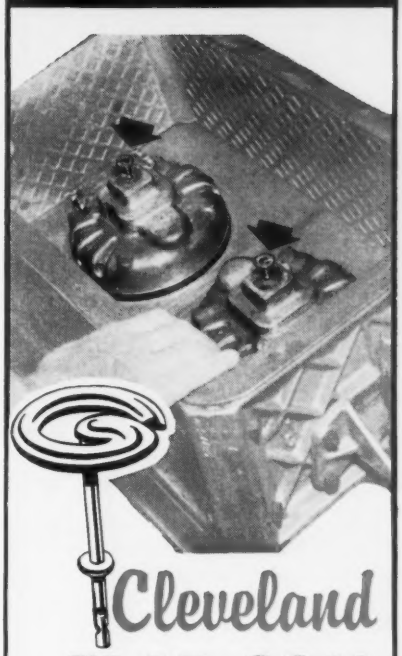
Publishes Plant Maintenance and Engineering Guide

"Techniques of Plant Maintenance and Engineering—1955," proceedings of the annual conference held concurrently with the Plant Maintenance and Engineering Show, has been published by Clapp & Poliak, its producers.

Containing 218 pages, the volume has 61 charts and diagrams. More than 1000 questions, presented by 2400 executives to 56 experts drawn from leading industrial plants, highlight the book. A question-and-answer section gives a vivid picture of current maintenance problems faced by plants today.

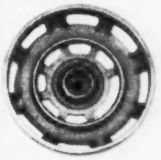
Sent without charge to those who attended the conference in Chicago last January, the volume may be obtained for $7.50 postpaid from Clapp & Poliak Inc., 341 Madison Ave., New York 17.

TAYLOR & BOGGIS
USES 18% LESS SAND
SAVES LABOR WITH...



Cleveland
FLAT COIL
CHAPLETS

Note clean chaplet breakoff on end bell hub which reduces cleaning operations.



Due to their low cost, Taylor & Boggis also uses flat coil chaplets for soldiers in deep green sand core pockets.

Only 1/2" to 1" of sand cover is required in the cope for firm support of these end bell core chaplets. Flasks are lighter and 18% less sand is handled on the end bell mold line.

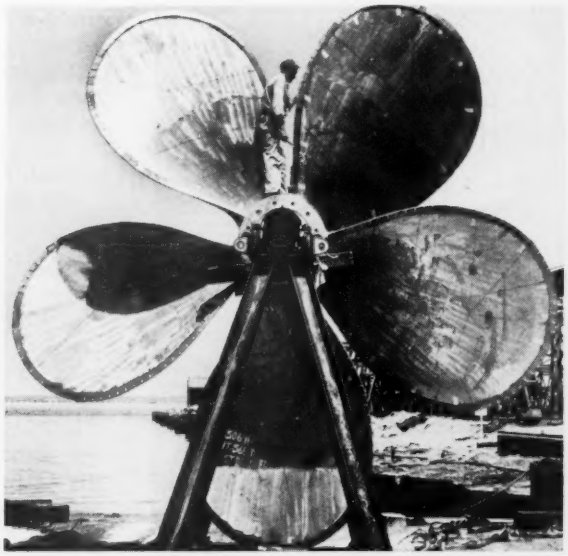
In addition to providing positive core support, Cleveland Flat Coil Chaplets speed molding at Taylor & Boggis due to uniform stems and plating thickness. Check today for details on flat coil chaplet advantages in your molding lines.

Write today for *sample* and catalog!

Cleveland Since 1890
CHAPLET & MFG. CO.
26471 LAKELAND CLEVELAND 32, OHIO

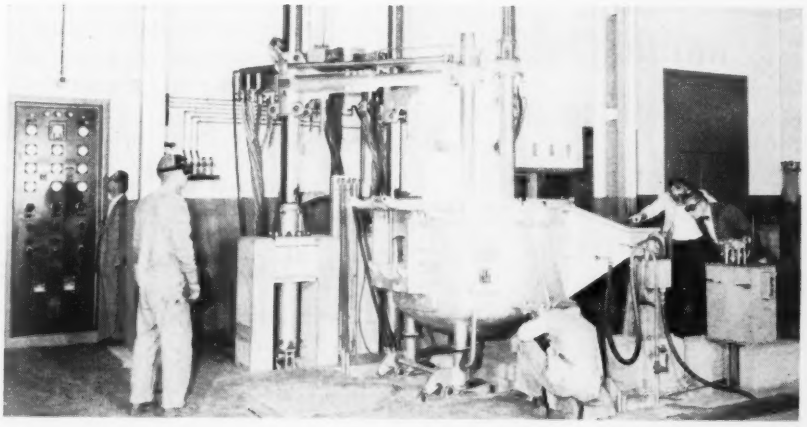
News Views

POWERAMA: General Motors Corp. will stage a giant outdoor exposition portraying the contributions of diesel and aircraft power to America's industrial economy on Chicago's lakefront, Aug. 31 to Sept. 25. A 1-million-sq-ft area adjacent to Soldier Field will be open to the public free. Inspecting an exposition model are left to right, C. R. Osborn, vice president GM's engine group, GM President Harlow C. Curtice, Thomas E. Hughes, general manager, Cleveland Diesel Division, R. Q. Armington, general manager, Euclid Division



HEAVY PROP: Four large variable-pitch, five-bladed propellers like this were shipped recently from Philadelphia to Newport News, Va., for the carrier U.S.S. Forrestal. Built by Baldwin-Lima-Hamilton Corp., Philadelphia, each cast manganese bronze propeller is about 21 ft in diameter and has a finished weight of 700,000 lb. Power for driving the Forrestal's propellers will be supplied by a 200,000-hp electrical propulsion plant generating a capacity sufficient to meet the requirements for a city of 1½ million people

INITIAL HEAT: First heat gets under way in 500-kva 3-phase furnace in the new chemical and metallurgical laboratory at Battelle Memorial Institute, Columbus, O. The furnace is expected to play an important part in melting and smelting research. Equipment is adaptable to a variety of special applications, as in investigations of cast refractories, and will be used also in the experimental production of alloy steels and in studies of desulphurization and slag. An oversized transformer on the unit provides voltage combinations from 23 to 554



ACROSS THE SEA: Walter R. Jaeschke, consulting engineer, Whiting Corp., Harvey, Ill., left, chatting with A. B. Everest and Mrs. Everest during the recent International Foundry Congress in London. Mr. Everest, Mond Nickel Co. Ltd., London, is the newly elected president of the Institute of British Foundrymen. Mr. Jaeschke represented American Foundrymen's Society at the International Foundry Congress

Huge Auto Body Dies for Tight Detroit Schedules Rammed in Half the Time with a B&P MOTIVE SPEEDSLINGER

Pressed by customer demand for larger capacity and faster delivery, Central Iron Foundry, Detroit, outstanding producer of automotive body dies, again turned to Beardsley & Piper equipment. Central was one of the first users of B&P Sandslingers and Speedmullors, and knew the advantages of B&P's labor-saving foundry equipment. Of course, B&P had the answer: A Motive Speedslinger was coupled with a Model "80" Speedmullor and a B&P Stationary Preparator. The Preparator and the Speedmullor thoroughly condition and fully mull all of Central's molding sand for top capacity Speedslinger ramming. The entire molding sand unit and the Motive Speedslinger are shown on the left. Do you have a similar problem? *Write today to Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Ave., Chicago 39.*

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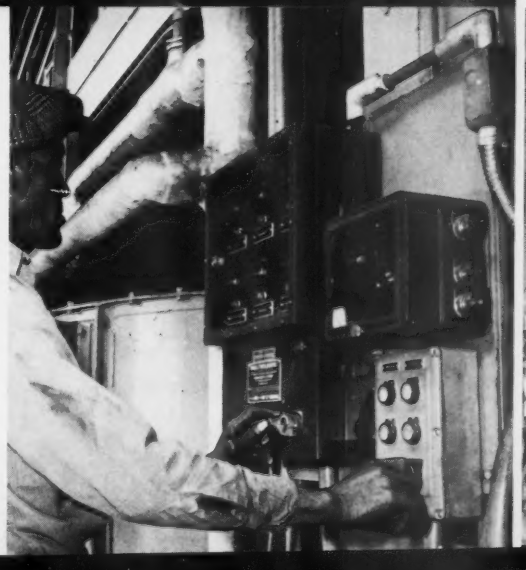
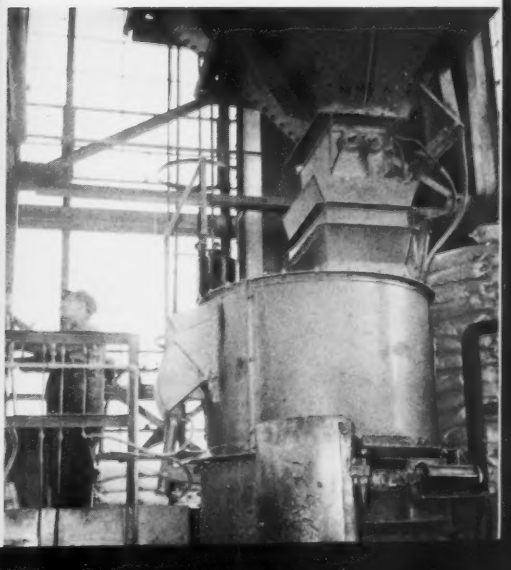
Get the full story of Central Iron Foundry's operation. Ask for "The Shape of Things to Come", showing numerous photographs

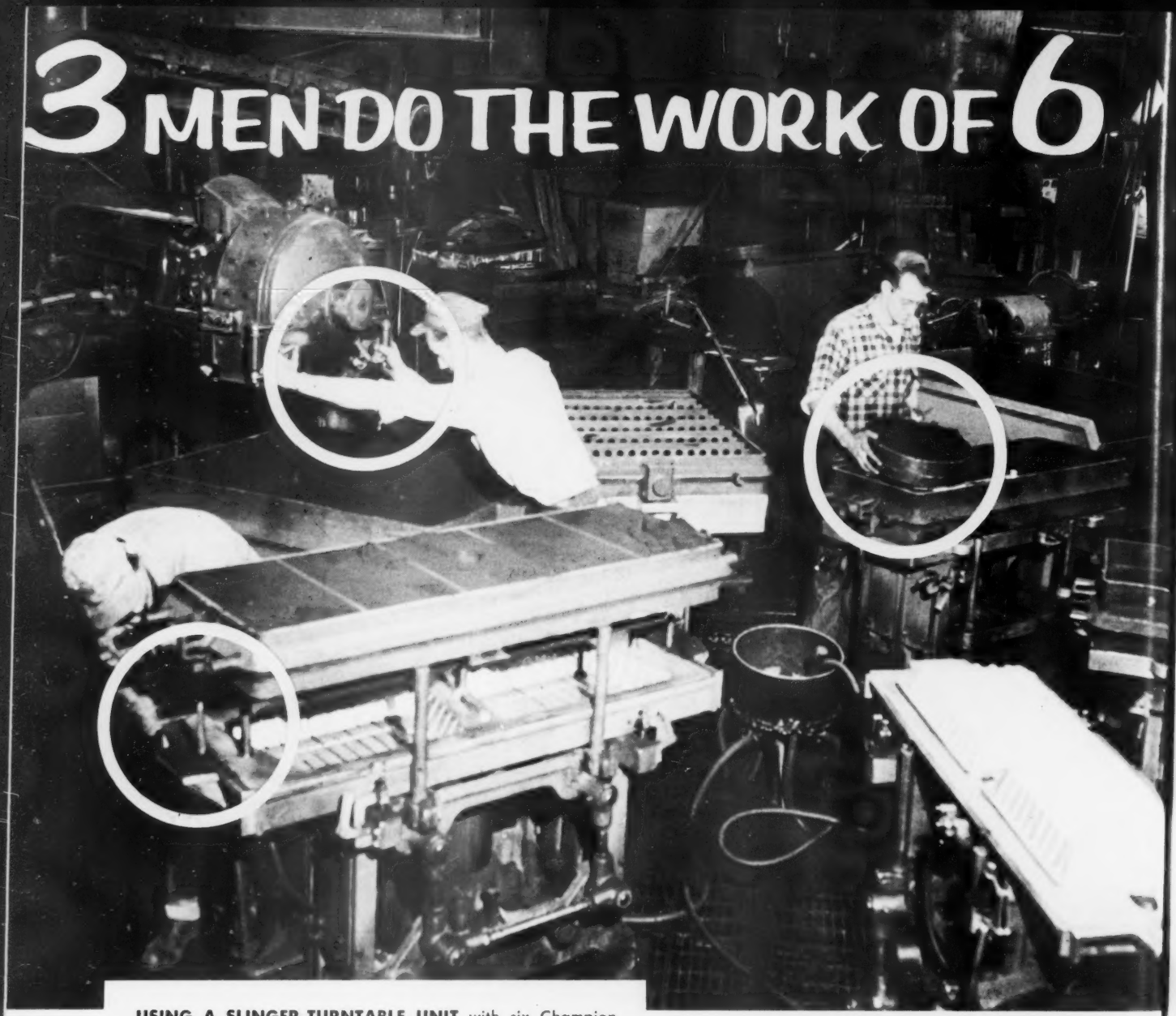


LEFT PHOTO Skiptrol and Mulltrolmatic control units. The Skiptrol controls the loading of the Skiphoist bucket. Mulltrolmatic times and controls all phases of the mulling cycle. The complete mulling cycle requires only 1½ minutes.



RIGHT PHOTO A B&P Model "50" Speedmullor mulls all of Central's core sand. For this exacting work sand mixtures must be perfect, and top capacity is essential.

3 MEN DO THE WORK OF 6



USING A SLINGER-TURNTABLE UNIT with six Champion Speed-Draw Machines three men ram 160 large molds on each shift at the Bennett-Ireland foundry at Norwich, N.Y. Cope and drag patterns for three different jobs are run at one time and jobs may be changed in a few moments without interrupting production.

Six Champion Speed-Draw Machines on a 16-foot turntable—the equivalent of six cope and drag molding stations—are served by a single Stationary Sandslinger supplied with Speedmullor mulled molding sand by a B&P Rotofeed. The equipment is highly flexible . . . three different jobs are run at one time . . . patterns may be changed without interrupting production . . . and the unit may be operated at capacity or at part-capacity with equally high man-hour efficiency. If you operate a jobbing foundry, information on these units will help you. Write to *Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Ave., Chicago 39.*

AN '80' SPEEDMULLOR thoroughly mulls all of the molding sand for Bennett-Ireland's molding operations including that for the Stationary Sandslinger. Return sand is delivered to the mullor hot and is thoroughly cooled during the 1½ minute total mulling and cooling cycle. Another Speedmullor —a '40'—thoroughly mulls all of the foundry's core sand.

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NONDESTRUCTIVE TESTING

Is Symposium Subject

TECHNICAL discussions at the recent American Foundrymen's Society convention in Houston, Tex., were concluded with a well attended symposium devoted to the subject of nondestructive testing.

As an introduction to the symposium, a joint luncheon preceded it sponsored by the AFS in co-operation with the Society for Nondestructive Testing. A. W. Gilbert, Carbide & Carbon Chemical Co., Texas City, Tex., and chairman of the Houston section, Society for Nondestructive Testing, presided.

The general subject of the symposium, **Nondestructive Testing—A Valuable Tool for the Foundryman,** was reviewed at the luncheon by Hans J. Heine, technical director, AFS. Mr. Heine said that the average foundryman has made far too little use of a number of very important tools which can achieve much in his quest for an improved casting quality. At the same time he pointed out that nondestructive proof of the existence of a defect in a casting does not in itself express the influence of that defect upon the strength or serviceability of the part. Unfortunately, there is a serious lack of specific information on the influence of defective conditions upon strength and serviceability.

Mr. Heine warned that the foundryman must not assume that there is such a thing as a universal nondestructive test, which is applicable to every kind of material under all operating conditions. All of the well established methods of nondestructive testing, he added, are subject to limitations.

Calling attention to the tentative radiographic terminology developed through the American Society for Testing Materials, the speaker said it would help appreciably the application of nondestructive tests if all the different producers, consumers, government agencies, consulting laboratories and technical societies would adopt a common terminology for the discontinuities that may occur in castings.

Increased Foundry Profits through Nondestructive Testing, the subject of the first symposium paper, was presented by Kermit Skeie, Magnaflux Corp., Chicago. Mr. Skeie pointed out how foundrymen can use experimental stress analysis to hold and increase their business. The tools of this process can be used to make a part easier to cast, to reduce weight, to convert parts from other methods of fabrication, and to use them as a sales tool to get customers to look to the foundry for their products. He went on to say that as long as so few design engineers have any knowledge of foundry practices, and as long as a foundryman will try to make a casting out of any blueprint or pattern furnished him, castings will continue to be sold by the pound as castings and not by the piece as engineered material.

Mr. Skeie showed slides of typical castings to illustrate his points. In one case a casting which had proved generally satisfactory was redesigned at the foundry's initiative by means of the brittle coating technique. The redesigned part was stronger, easier to pour and the foundry was able to reduce its price 10 per cent while increasing its profits through a reduction in defects.

Other examples of use of nondestructive testing methods were sampling inspection with magnetic or penetrant methods to assure complete dependability of the castings. Another application, where 100 per cent inspection was required, consisted of a conveyorized Magnaglo unit in a steel foundry. This released four men for other duties and yet allowed for a 60 per cent increase in output, resulting in a return of the investment in six months.

Improving Casting Quality through Nondestructive Testing, by Francis H. Hohn, Scullin Steel Co., St. Louis, was a discussion of that company's work in maintaining castings' soundness at the desired level. Testing equipment includes two x-ray units and a portable magnetic particle inspection unit.

In one example of the equipment's use, small standard test plates were poured from individual heats and x-rayed. Standards were set up showing variations from the best to the worst porosity conditions found in the test plates. These plates then were used to gage the amount of porosity expected in production castings. When test plates of a particular heat met a certain standard, a known quantity of porosity could be expected in the production castings. X-ray and magnetic particle inspection methods also are used for identifying and locating causes for other variations from desired quality levels, and to check on improved molding techniques for raising these levels.

Experimental Stress Analysis, by Joe W. Beckham, Texas Foundries Inc., Lufkin, Tex., discussed the use of this process in improving or redesigning castings to obtain stronger and lighter parts. Typical examples of this type of work were described. Mr. Beckham urged that foundries work with their customers to obtain improved design of castings which will result in better parts produced at lower costs.

Use of Isotopes for Castings Inspection, by Jewelle N. Ketchblaw, Industrial Welding & Testing Laboratory, Houston, detailed the use of cobalt 60 in radiographic work. This material provides a small source of high-intensity rays and can be handled safely with normal safeguards, she said. Various industrial laboratories are equipped to handle casting inspection work of this type in their own shop or in the foundry itself.

A practical method of obtaining consistent radiographic sensitivity was discussed in **Industrial Radiography** by Kenneth G. Roberts, Naval Research Establishment of Canada, Halifax, Nova Scotia. Sensitivity, which is the ratio of minimum detectable thickness to the total thickness, is measured by a penetrameter. By the use of step wedges, density was measured and values for varying voltages at constant density for different metals were obtained. These data prove useful for use by nontechnical operators. Varying voltage, the speaker said, can give close sensitivity of steel, brass, aluminum

and magnesium parts of different thicknesses. Sensitivities of 10 per cent or better regularly are obtained.

Discussing **Use of Radiography in the Nondestructive Testing of Castings,** W. D. Kiehle, Eastman Kodak Co., Rochester, N. Y., presented a number of slides illustrating this work. In addition to examples of radiographing castings for revising gating design as an aid in improving casting soundness, examples of 100 per cent inspection of castings also were shown.

STEEL CASTINGS

FOUR TECHNICAL SESSIONS and a roundtable luncheon comprised the program of the Steel Division. J. B. Caine, consultant, Cincinnati, opened the first technical session with a paper titled **A Metallographic Study of Ruptures in Steel Castings.** This study had two prime objectives —1. To establish a basis for more precise diagnosis of fractures and service failures than unaided visual examination. 2. To obtain basic information as to the mode of the various types of fractures.

Mr. Caine differentiated between types of ruptures in this way. Tensile fractures are ragged and sawtooth like, with extensive plastic deformation at the fracture. Such fractures are rare in service. Transverse fractures show microscopic shatter cracks or strain lines ahead of the visible crack before final fracture. These shatter cracks or strain lines disappear after final fracture. The fracture then is ragged, showing plastic deformation, but not to the degree shown by tensile fractures.

Fatigue fractures show a duplex fracture. The very flat fatigue fracture itself is possibly intergranular. The final fracture is either transverse, as detailed in the foregoing paragraph, or occurs under extreme stress concentration designated by an angular fracture possibly showing micro-cracks.

Continuing, the speaker asserted that notched impact (brittle) fractures show a relatively flat, distinctively angular fracture with angular projections. Microcracks may be associated with this type of fracture. It is possible that these microcracks plus the angularity of the fracture increase as the resistance to rupture of the metal under stress concentration decreases. Cooling (quench) cracks are distinguished by their sharp, continuous nature, or a zig-zag acicular shape, depending on the microstructure in which they formed. They also can be distinguished by their location in the part.

Hot tears, Mr. Caine stated, are distinguished by their usual discontinuous nature and by their association with ferritic interdendritic metal in the as-cast structure. Intercolumnar shrinkage is distinguished by the scalloped edges of the elongated voids and their association with ferritic interdendritic metal in the as-cast structure. The speaker advanced proof and hypothesis regarding fundamental mechanisms forming these ruptures, especially hot tears and intercolumnar shrinkage.

In a second paper, **High Temperature Impact Properties of Cast Steel,** C. F. Christopher, research metallurgist, Continental Foundry & Machine Co., East Chicago, Ind., said probably the most serious problem confronting steel casting makers today is elimination of hot tearing. The speaker believes that the solution involves a study of the brittleness characteristics of various chemical compositions at elevated temperatures.

He feels further that these characteristics can be shown best by dynamic testing which detects high-temperature embrittlement to its fullest extent. The investigation showed that all steels exhibit high-temperature brittleness which follows a definite relationship to constitutional composition.

In conclusion, Mr. Christopher stated that hot tearing susceptibility is natural in all steels. The range of hot tearing depends upon the liquidus-solidus relationship, which determines the extent of heterogeneous selective freezing. Elimination or minimizing of hot tearing, therefore, depends upon pouring temperatures, which sets up the stress and scientific heading and gating, and chilling, which eliminates or dissipates the stress.

A third paper, **Influence of Molding Materials on Incidence of Hot Tearing,** by J. M. Middleton, British Steel Castings Research Association, Sheffield, Eng., was abstracted by C. W. Briggs, technical and research director, Steel Founders' Society of America, Cleveland. This paper reported the rerunning of a previous investigation, this time using a 35-lb casting in place of the previous small one. The discussion covered the effect of ramming density of green and dry sand and effect of different bonds.

It was brought out in the summary that pouring at lower temperatures gave the least tears, and that room temperature characteristics of molding materials bear little relationship to characteristics at casting temperatures.

Now There's a Good Question—Have You an Answer? was the theme of discussion at the Steel Division roundtable luncheon. V. E. Zang, Unitcast Corp., Toledo, O., presided. Shell molding of mild steel was discussed and several examples of firms doing shell-cast steel work were cited. Advantages and disadvantages of rapid steel melting were covered as were various types of casting defects.

At the second steel session, Trevor Davidson, chief engineer, Bucyrus-Erie Co., South Milwaukee, Wis., presented a paper, **What Design Engineers Look For in Castings.** In prefacing it, the speaker said a more appropriate title would have been "What the Foundry Should Do To Maintain the Designer's Interest," this because all forms of fabrication are being refined and improved and are making inroads on castings.

There was a time, he said, when castings were used because there was no other way to attain the results desired, regardless of cost. Today, relatively few parts cannot be made successfully in several ways, and castings are used simply because they are the least expensive. Appreciation of what the job requires and imagination to attain it will help to keep foundry tonnnage up.

Among the requisites to the designer, Mr. Davidson listed soundness; consistency in manufacture, including physical properties, chemistry and close dimensional tolerances; simplest possible design, and freedom from distortion.

In a second paper, **Steel Castings —Their Engineering Advantages in Weldments,** E. J. Wellauer, Falk Corp., Milwaukee, emphasized that the important consideration is to make a product that does the job functionally. The criterion is not the price per pound. The idea is to sell quality.

The speaker stated that castings sometimes do a better job functionally than weldments and jobs which start out as weldments frequently wind up as castings. Arguing in favor of weldments is the fact that

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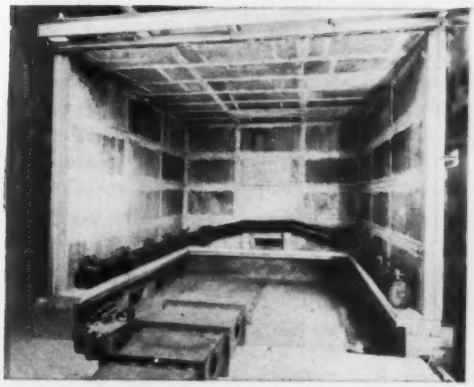
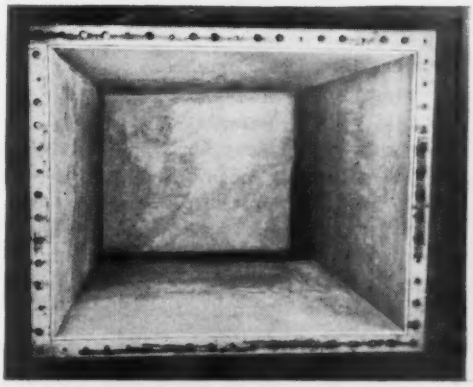


Roof and wall panels are made of B&W Insulating Concrete Mix in this stress relieving furnace.

Covers, measuring six and eight feet in diameter, for these 10 draw and hardening furnaces are also lined with B&W Insulating Concrete Mix.



Shown above is a section of a gas turbine exhaust stack lining completely cast with B&W Insulating Concrete Mix.

Here are a few examples of how furnace operators are cutting installation and fuel costs with versatile insulating concretes.

In intricate furnace linings, for instance, B&W Insulating Concrete Mixes do away with time-consuming hand fitting and the many necessary special shapes. These refractory concretes, which can be exposed to flame up to 2200F, have approximately twice the insulating value of regular refractory castables, and are as easy to use.

Other uses include: Holding furnace roof panels, Portable furnace extensions, Annealing furnace bung covers, Patching insulating firebrick linings, Lining ducts and flues, Protection for furnace foundations, Hardening furnace cover linings, Car bottom linings, Cooling pit walls and roofs, Dust collector linings, Door linings, Protection for furnace steelwork.

Briefly, B&W Insulating Concrete Mixes can be put to profitable use wherever the combination of a castable's fast, low cost installation plus insulation is needed. Though somewhat less efficient thermally than B&W Insulating Firebrick, B&W Insulating Concrete Mixes are far superior to regular castables in insulating value. In fact, 7 inches of B&W Insulating Concrete Mix are equivalent, in insulating value. to 24 inches of regular refractory concrete or firebrick.

Get all the facts from your local B&W Refractories Engineer—or write for Bulletin R-22, which gives complete details on B&W's entire line of refractory castables.

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smaller pieces or components provide for better inspection and higher factors of safety. In weldments it is possible to have components which give the required quality and stress carrying ability.

An advantage of using steel castings in weldments, Mr. Wellauer declared, is that they lend themselves well to streamlining of the product. Furthermore, in castings it is possible to eleminate stress concentrations which would be found in weldments made fully of rolled steel.

Lyle L. Clark, Armour Research Foundation, Chicago, presented an oral report on the Steel Division's research project on hot tearing. In this, he asserted the general feeling is that mold and core materials are the No. 1 factor in hot tearing, as was reported a year ago by Research Committee Chairman Clyde Wyman, Burnside Steel Foundry Co., Chicago.

It is being observed, the speaker continued, that B-type castings made from steel dexodized with aluminum are showing a greater tendency toward hot tears than those made from steel not deoxidized with aluminum. Why this is so is not known.

Needed, Mr. Clark said, is a better way to determine titanium content in steel. Various laboratories report wide variations of this element in the same steels. In general, the speaker pointed out that the more completely steel is deoxidized the greater is the tendency for the metal to hot tear. In concluding, Mr. Clark stated that the committee's research has been concerned with investigation of steel castings made by some six foundries in cores produced and supplied by American Steel Foundries.

This session concluded with B. F. Kline, Southern Pacific Co., Sacramento, Calif., discussing **Use of Steel Castings by the Southern Pacific Co.** He pointed out that although the nation's railroads use about 30 per cent of steel castings output, they often experience difficulty in getting proper quality for this service. Steps are being taken to rectify this situation through closer co-operation between the Association of American Railroads and American Foundrymen's Society.

With steam locomotives disappearing, casting sizes are declining, the speaker observed. Considerable tonnage of steel castings is used in revenue freight cars, of which there are over 2 million in the country. An automobile car, for example, has 7020 lbs of steel castings in 11 different types. The largest—a truck side frame—weighs 2450 lbs. Bolsters weigh 1650 lbs. Repairs to freight cars account for a big tonnage of castings.

Mr. Kline mentioned that under the specifications, many steel castings cannot be welded. At one time, rejections were high, but there is little trouble today because steel foundries know and understand the requirements. Most failures of steel castings, he said, are from fatigue.

First paper at the third steel session was **Manufacture of High-Quality Pressure Tight Steel Castings,** by J. F. Wallace, Case Institute of Technology, Cleveland. The discussion concerned the application of research information to production programs at the Watertown Arsenal. The parts considered were for severe service and were needed in a hurry. They are used in a wide range of temperatures and have high stresses because the parts must be made light. Practices are controlled as closely as possible to obtain sound, crack-free, fine-grained castings. The metal is melted and the castings are heat treated to close limits. Molding and pouring must be controlled, and a large number of risers and pads are required to secure directional solidification. Mr. Wallace discussed the various details that were followed in the production of these castings.

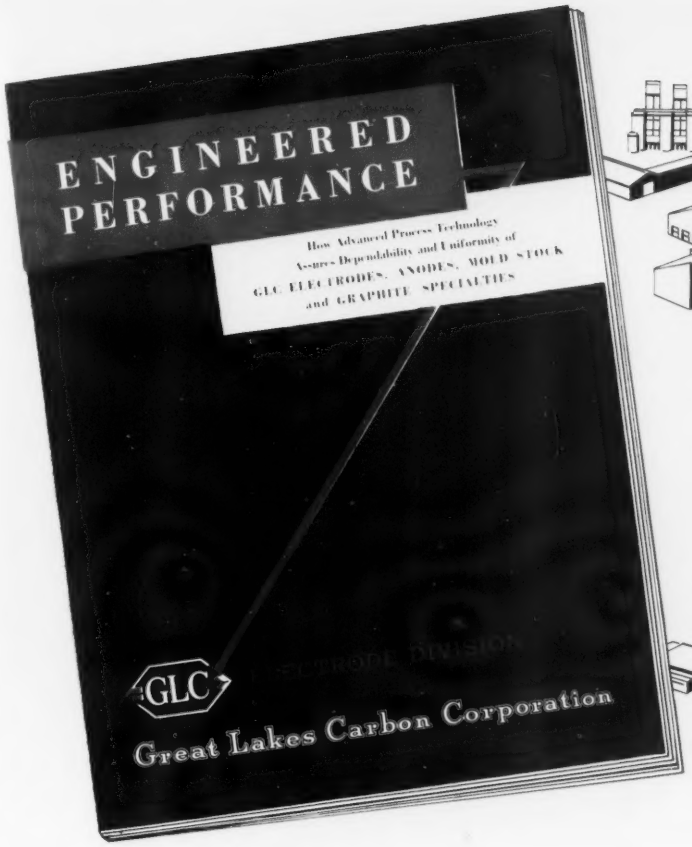
C. B. Williams, Massillon Steel Castings Co., Massillon, O., presented a paper, **Factors That Contribute to the Production of Clean Castings.** The speaker discussed the planning that gets under way as soon as the blueprint has been received. This includes such matters as pattern construction, heading and gating, cores, type of sand to be used in cores, cleaning, etc. After the pattern has been made or received from the customer, it is inspected by the planning committee and the head location and size, gate location and size, cracking ribs, etc., are marked on the pattern.

Mr. Williams discussed operations at his plant, beginning with the melting department, which has two furnaces, one melting 6000-lb and the other 12,000-lb heats. The foundry uses all new sand facing and new sand for cores. Sieve tests show that quite a bit more than 10 per cent of the sand falls on each of four different screens, and almost 10 per cent falls on each of six different screens, which would approximate a five-screen sand. The mixture for facing sand for small molds is a 50-50 mix of two sands, 4.0 per cent bentonite, 0.6 per cent corn flour, 0.4 per cent dextrine, 3.6 per cent to 4.0 per cent moisture. The mixture for large castings is a 50-50 mix of two sands with 4.5 per cent bentonite, 0.6 per cent corn flour, 0.4 per cent dextrine, 4.0 to 4.6 per cent moisture. While the high bond does not provide the best flowability, it does give a sand that is not too brittle to handle. When rammed to a minimum of 85 mold hardness, a good finish is provided with no washing or scabbing.

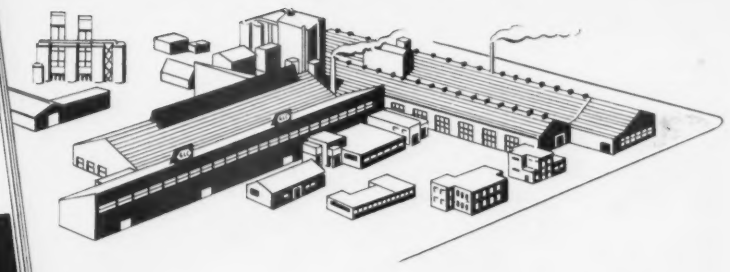
On large castings two gating systems are used wherever possible and the casting is poured from two separate ladles. Parting line gates are used on a large majority of small castings. Every effort is made to arrange the gating systems so there will be a minimum amount of splashing and washing of the mold. Runner gates or in-gates are a little smaller in the cross-sectional areas than the down gates, which means that they are slightly choked.

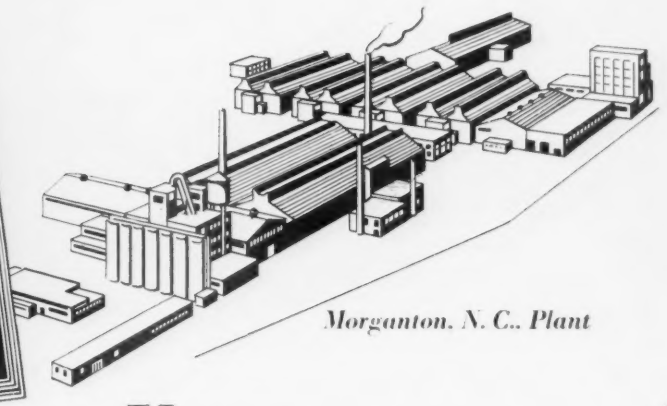
The third paper, **Bottom-Pour Ladle Practice** was presented by A. W. Fastabend, Indiana Harbor Works, American Steel Foundries, East Chicago, Ind. Changes in furnace practice from acid to basic necessitated changes in ladle practice. After the change, refractory failure usually was due to excessive corrosion extending about 2 feet from the bottom, or between the brick joints. The study of factors affecting lining erosion indicated that the manganese-silicon ratio of the metal, length of ladle service, metal tap temperature and length of time teeming molds had no effect. The only factor found to affect ladle erosion was length of time the slag blanket remained at a constant level. From this investigation, the practice of dumping the slag from the ladle immediately after teeming was instituted.

More satisfactory results were accomplished by developing a double lining. On the small 8-ton ladles, a 2-in. shell lining and a 4½-in. side arch fire clay brick were used to replace the single cupola block. The shell lining was put in to be permanent and in relining, only the arch brick are replaced. The brick bottom was sloped toward the nozzle open-



Niagara Falls, N.Y., Plant





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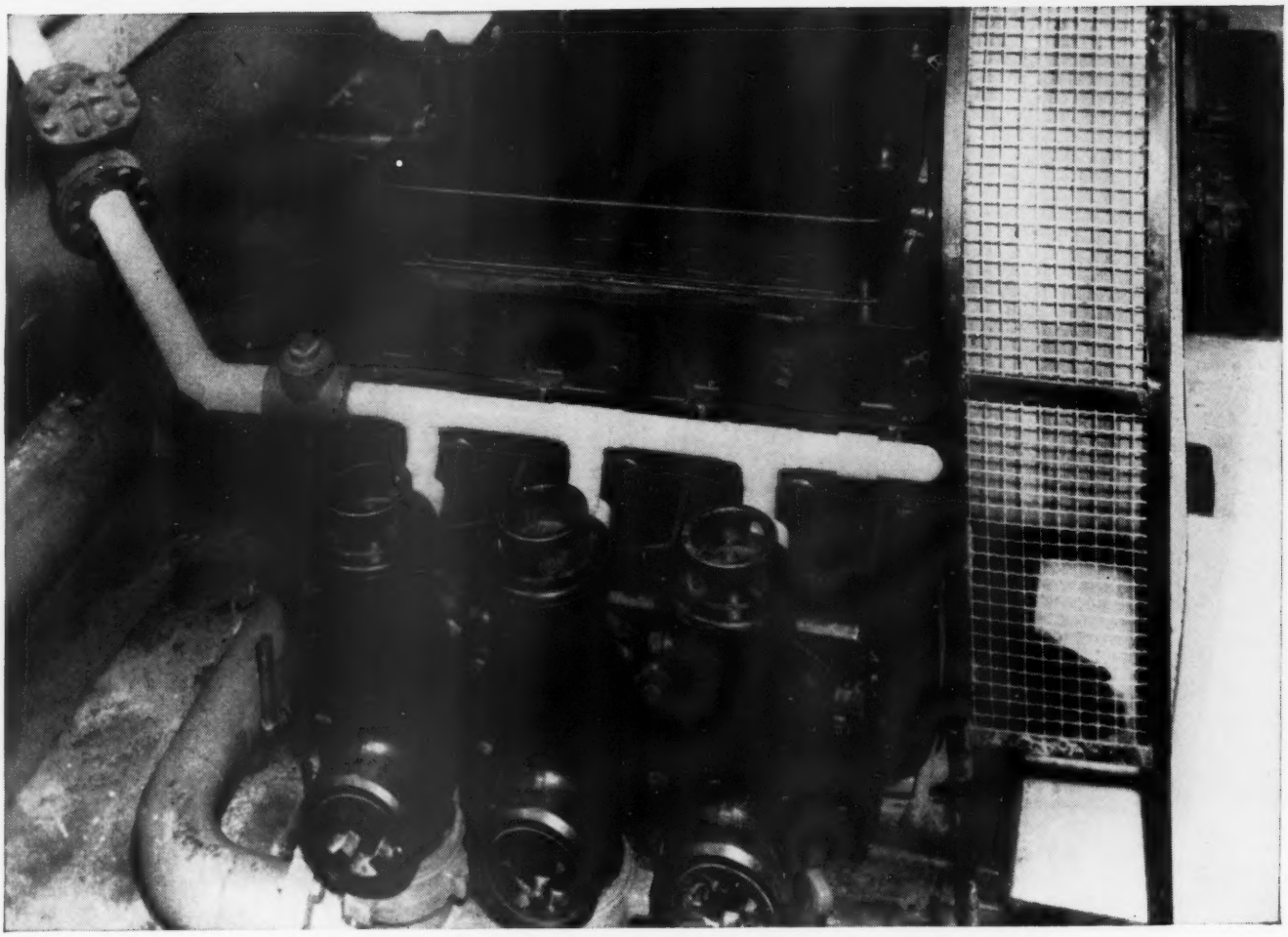

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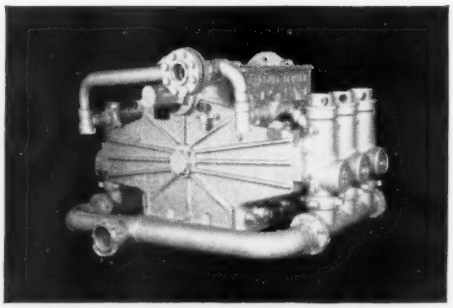
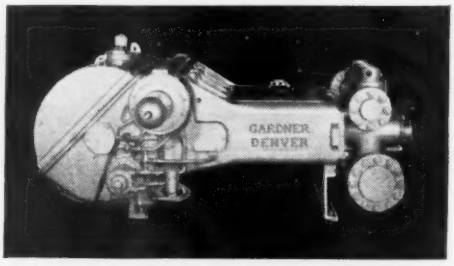


Model PL-7 six-cylinder plunger pump for pressures to 10,000 pounds. Capacity ranges up to 408 gpm.



Model PA-8 triplex plunger pump for pressures to 8,000 pounds. Capacity ranges up to 263 gpm.

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ing with a 3-in. pitch. On top of the brick, about 2½ in. of regular, proprietary bottom mix was hard rammed, taking care not to go up the sidewalls. When erosion developed on the brick lining near the bottom, a brick patch was put in around the ladle, and the patches have held up well. On new ladles, the lip is adjusted so that about 4 in. of slag is carried on top of the heat for insulation. Results of the changes were gratifying. In addition to material savings, labor costs have been reduced. Also, the new practice resulted in reducing metal temperature loss from furnace to pouring cup from 100 to 200° F to 70 to 120° F.

In the final paper of the session, Arthur P. Guidi, Texas Electric Steel Casting Co., Houston, Tex., discussed **Ladle Practice.** In the ladle practice followed by his company, shells for 5-ton ladles are 48 in. in diam and 52 in. deep. When building a new ladle, the bottom is bricked with 9-in. stiff mud fireclay brick imbedded in a high-temperature cement. Side walls then are bricked with 9-in. stiff mud fireclay brick, using a ratio of two No. 2 arch to one No. 1 wedge brick. Side wall brick also are dipped in high-temperature cement. The bottom is rammed with a ganister mixture to a rammed thickness of 2 in. When the bottom is completed, the nozzle is set and the well is rammed. The ladle then is flame dried. One ton, bottom pour, 3½-ton teapot and 275-lb monorail ladles also are used. In the larger ladle the stopper assembly consists of a graphite head, one bottom sleeve and five straight sleeves.

Technical sessions on steel castings were concluded with one pertaining to riser dimensioning, application of chills, and production of steel car wheels in graphite molds.

Harold F. Bishop presented a paper, **Simplified Method for Determining Riser Dimensions,** which was prepared with the co-operation of his colleagues, E. T. Myskowski and W. S. Pellini of the Naval Research Laboratory, Washington. In this the authors pointed out that J. B. Caine's excellent method of determining riser dimensions requires considerable calculations. After some study and experimental work, it was found possible to replace it with shape factors in terms of length, width and thickness of the casting. From these factors empirical graphs were developed relating riser volume to casting volume to permit rapid determination of minimum effective risers for simple castings. Additionally methods were devised applying to complex shapes featuring thin sections joined to heavy sections, and cylindrical sections with small cores.

Application of Chills for the Solidification of Rib and Boss Hot Spots on Plates, by H. F. Bishop and E. T. Myskowski, was discussed by Mr. Bishop. In this the authors investigated the rib and boss effect on shrinkage condition in parent plate sections based on previous studies of feeding steel castings. Thin appendages act as cooling fins and create a chilling effect; conversely, thick appendages create a hot spot at the junction, causing shrinkage.

Study indicated that placing chills on the bottoms of ribs and bosses neutralized the hot spot effect. From that investigation was developed a chart for determining proper size of chill which adequately would counteract, but not over-chill, and cause greater shrinkage than created by the hot spot. This practice eliminates necessity of using specially designed chills to fit against the junction of plate and rib or boss. In an example given for a plate 4 in. thick with a rib 3 in. thick and 8 in. deep it was shown that a chill 1.25 in. thick placed on the bottom of the rib would eliminate shrink at the junction of the rib and the plate.

Final paper, **Pressure Pouring and Graphite Permanent Molds Used in Production of Steel Car Wheels,** presented by H. H. Hursen, Griffin Wheel Co., Chicago, described in detail the procedure for making cast steel car wheels. In this a graphite mold is located over a refractory tube projecting down into a ladle of molten steel. Tube is attached to a refractory cover which seals the ladle in a pit. Air pressure is admitted into the pit and ladle forces the steel up the tube into the mold. When the mold is filled, as indicated by appearance of the metal in the risers, a stopper in the mold is pushed down to close off the metal inlet passage. Air pressure is released, permitting excess metal to drain into the ladle.

MALLEABLE SHOP COURSE

ACTIVITIES of the Malleable Division included a two-session shop course. The first session was devoted to **Pearlitic Malleable**—specifically such matters as the various methods for producing it, the base iron, heat treatment, controls, finishing and properties.

These areas were covered by a panel of four consisting of Lyle Jenkins, Wagner Malleable Iron Co., Decatur, Ill.; C. F. Joseph, Central Foundry Division, General Motors Corp., Saginaw, Mich.; Milton Tilley, National Malleable & Steel Castings Co., Cleveland; and P. F. Ulmer, Link-Belt Co., Indianapolis.

Emphasized in the discussion was the need for close controls over raw materials, heat treating, furnace atmospheres and temperatures. Mr. Joseph pointed out that good pearlitic malleable must have carbon as close to the surface of the casting as possible. The metal has high springback in straightening or coining, and because of this some shops are using hot straightening. Mr. Tilley commented upon the high ratio of yield strength to ultimate strength and observed that this is one of the reasons for use of pearlitic malleable.

At the second malleable shop course session, attention was directed to hot tearing. This subject was pointed up by B. C. Yearley, National Malleable & Steel Castings Co., Cleveland, who contributed a paper posing the question **Has Research on Hot Tears Prevented Their Occurrence?**

At the outset, the speaker made it clear that for the purpose of his discussion, a shrink crack is not a hot tear, and further that anything that applies to steel applies to malleable and vice versa. There are two schools of thought concerning hot tears, he said. One holds to the stress theory and the other the strain theory.

Mr. Yearley asserted that the condition in the mold is identical with pulling a specimen in a tensile machine. Either the grips slip or the material stretches or breaks. If it were possible to make a mold that will not restrain metal, or if the metal could have infinite ductility, there would not be hot tears. In the opinion of the speaker, the answer to causes of hot tears lies somewhere between the two theories. His concluding remark was that not enough information is available on ductility of metal at elevated temperatures.

F. W. Jacobs, Texas Foundries Inc., Lufkin, Tex., presented a paper on **Effects of the Melting Process on the Cracking Tendencies of Malle-**

able Iron. It was pointed out the bulk of scrapped malleable castings result from cracking of the castings and that the foundry makes corrective moves without getting at the real cause of the trouble. Conditions which are satisfactory for one casting may not be for the next.

In the speaker's foundry, malleable iron is made by the duplex process. It was ascertained that on good days the iron was least fluid. Close control of the iron was attempted by placing limits on all melting variables, this including metal charge and cupola and air furnace operations. Among other things, practice has been standardized to keep iron oxide in the cupola slag under limits of 5 and 6 per cent and 12 to 15 per cent in the air furnace slag.

CORE and MOLDING SAND

SAND, with its wide application to all branches of the foundry industry, was discussed in nine sessions, more than were devoted to any other subject. The broad variety of topics covered included the description of an experimental foundry, raw material costs, scabbing, binders, casting finish, testing, agglomeration, load carrying power, and sand problems.

L. J. Pedicini, General Motors Corp., Detroit, at the first session described the **General Motors Experimental Foundry.** Part of the Process Development Section of GMC Technical Center, it occupies an area 120 x 240 ft and has facilities to permit casting on a simulated production basis of any ferrous casting up to an 8-cylinder block. Machine bases up to 2 tons in weight, aluminum castings up to 300 lb, and copper-base alloy castings up to 500 lb in weight can be readily handled. In his discussion Mr. Pedicini showed slides to illustrate the various types of equipment and the arrangement in the foundry.

What Are Your Raw Materials Costs? presented by S. C. Massari, Hansell-Elcock Co., Chicago, pointed out that considerably more than just the vendor's invoice price is involved. For example, unloading costs and handling expense within the plant are part of the cost, and often the material can be shipped cheaper in another form or type. Mr. Massari gave some examples to illustrate his point. One was handling of bagged bentonite. Use of skids holding 30 bags, which were moved by lift truck from the receiving department to the warehouse and later to point of use, resulted in an annual saving of about $3400.

Three papers provided the program for the second sand session. The first paper, **Steel Foundry Sands at Elevated Temperatures,** was the progress report of AFS Committee 8-L. It was presented by H. W. Meyer, General Steel Castings Corp., Granite City, Ill., retiring chairman of the committee which studies physical properties of steel foundry sands at elevated temperatures.

Mr. Meyer mentioned the committee has presented a series of 13 reports, the first being in 1939. He announced the committee's research equipment and activities are being transferred from Cornell University to the Locomotive Finished Material Co., Atchison, Kans. Prof. P. E. Kyle, under whose direction this work was pursued in the past, is no longer at Cornell. Mr. Meyer emphasized that the committee's reports will not solve many sand problems directly, but they will help to evaluate sand performance and the reports will encourage analytical thinking.

AFS Committee 8-J on physical properties of iron foundry materials at elevated temperatures also gave a progress report. This dealt with the **Scabbing Defect** and was presented by R. L. Doelman, Miller & Co., Chicago. This report, the speaker explained, is the third progress report and in it the committee deals with the last 19 of 53 sands being evaluated.

A New Foundry Sand Core Binder was described by Charles J. Gogek, George M. Moffett Research Laboratories, Corn Products Refining Co., Argo, Ill. This is a cereal binder, it was explained, and is not classified with resins. It is a white water solvent powder, contains dextrose and has high bake strength.

All metals have given good castings with the new material, Mr. Gogek stated. Cores have been made from very small ones to those weighing several hundred pounds. To prevent sticking, use of a release agent is recommended; kerosene has worked well. The material gives higher baked strength than yellow dextrin, and it has good moisture resistance if fully baked.

Sand mixed with the material will air-dry in about two hours, and it is suitable for either hand ramming or blowing. It was stated that some shops have been reclaiming sand using this binder for eight months. Asked what advantage the water soluble binder has over oil binder, Mr. Gogek answered that it possibly bakes faster and does less gassing. He added that it probably would be lower in cost, too, but each foundry would need to determine this in its own operation.

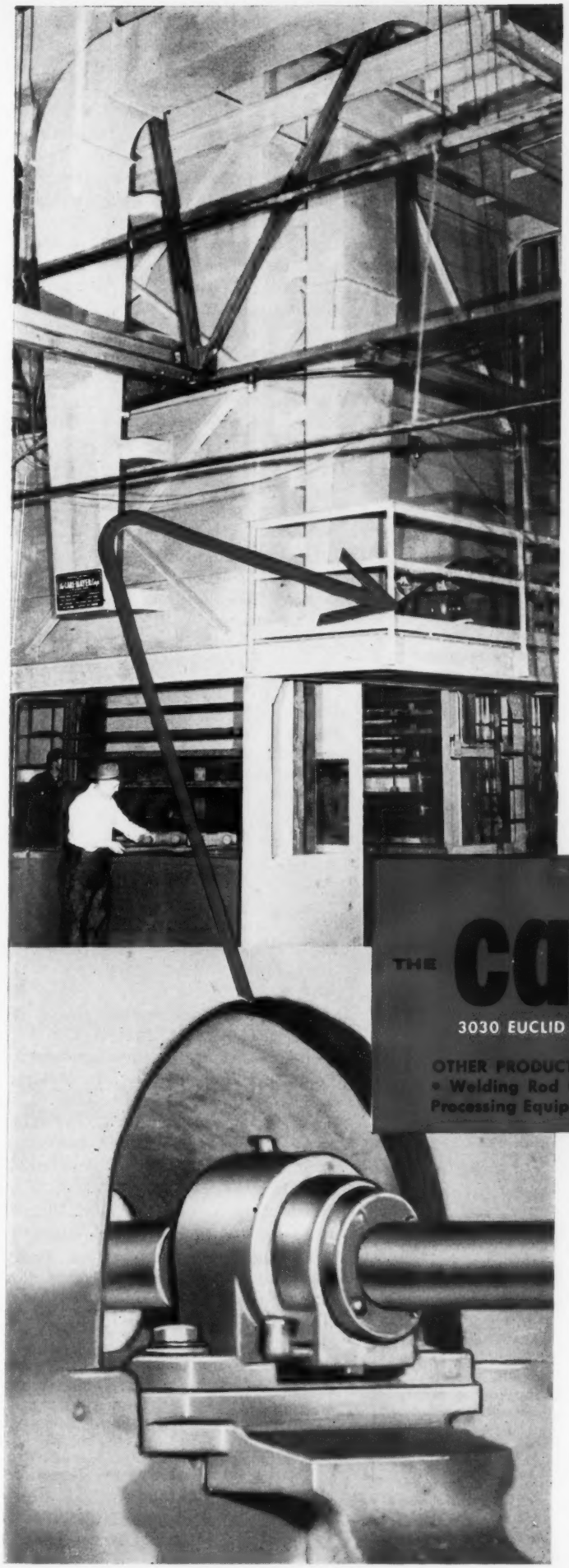
Two subjects were discussed at the third sand session. **It Is Not All Sand!,** by C. A. Sanders, American Colloid Co., Chicago, and Nathan Levinsohn, Minneapolis-Moline Co., Minneapolis, was presented by Mr. Sanders. The paper points out that a molding sand mixture, sand practice or sand control frequently is blamed for casting defects which actually are caused by other factors, of which there are many.

Showing slides of some two dozen defective castings, Mr. Sanders explained the source of the trouble in each case, none of them connected with sand. Among the conditions causing defects were slag inclusion, shift, reversed cope, run-out, crush, interrupted pouring, short pouring, insufficient clamping of flask, cold shut and too early shakeout.

Casting Finish a Function of Sand Additives, by Burdette Jones, John Deere Waterloo Tractor Works, Waterloo, Iowa, comprised results of a study intended primarily to reduce expansion defects. Mr. Jones said that a simple sand mixture generally is the most satisfactory one because each additive means one more potential variable. Furthermore, correcting one type of defect through a change in sand mixture may create a different one, consequently it is important to know the effect of each additive.

The speaker suggested experimenting with use of excessive quantities of sand additives and then reducing them gradually until desired results are obtained. In this connection he illustrated a gray iron casting having an unusual mottled finish that was obtained in experimental work with large additions of seacoal, wood flour and bentonite to the sand mixture. This type of finish would seem to offer possibilities in decorative work.

Standard Test Patterns Committee 8-T presented a progress report at the fourth sand session. It was titled **Current Status of Test Patterns for the Evaluation of Sand Mixtures,** and was reviewed by Committee Chairman Charles Locke, works manager, Westlectric Castings Inc., Los Angeles. It was pointed out that meth-



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ods and machines which have been devised to measure sand properties do just that and no more. From that point, use of the test information depends on the scrutiny of actual castings by the foundryman.

Needed, Mr. Locke stated, are standard test patterns that will indicate sand behavior. For that reason, Committee 8-T was established within the AFS Sand Division and was assigned the following objectives: (1) Secure information about the design and function of test patterns that have been in use during the past several years; (2) secure information about test patterns that are in current use; (3) recommend various designs of test patterns to other committees in the Sand Division; and (4) establish designs of test patterns for adoption by AFS as standards.

The first two objectives were the subject of Mr. Locke's report. Information was secured through a literature search and by a poll of foundry personnel. These references and findings are listed in the paper.

The research developed that in the earlier years, when natural bonded sands were predominant, interest was keen about sand durability and life. Test patterns were devised also to determine surface quality of castings under various sand conditions. By 1940, use of test patterns became more usual. Subjects dealing with penetration, veins, hot tears, rates of solidification, pinholes, rat tails, scabs, surface smoothness, collapsibility and gas evolution, were investigated with assistance of test castings.

It is apparent, Mr. Locke stated, that several designs are standard already, because of their simplicity and ability to respond to the testing conditions. The next phase of activity for the committee is to make a comprehensive survey of the test patterns actually being employed.

The fifth sand session had two papers prepared by speakers concerned primarily with ceramics. As explained by C. E. Wenninger, National Engineering Co., Chicago, the Sand Division feels that foundrymen can benefit by examining processes and products of other industries. Frequently such study develops information having application to foundry practice.

Principles of Agglomerating Processes, by Carl Ludwig, the Bonnot Co., Canton, O., pointed out that the mechanics of packing particulate matter, except for scale, is not unlike that in any integrated block structure. Mr. Ludwig's discussion detailed the influence of particle size distribution on packing, the effect of high packing pressures on void filling, the action of binders and the need for plasticity and fluidity in molding to shape.

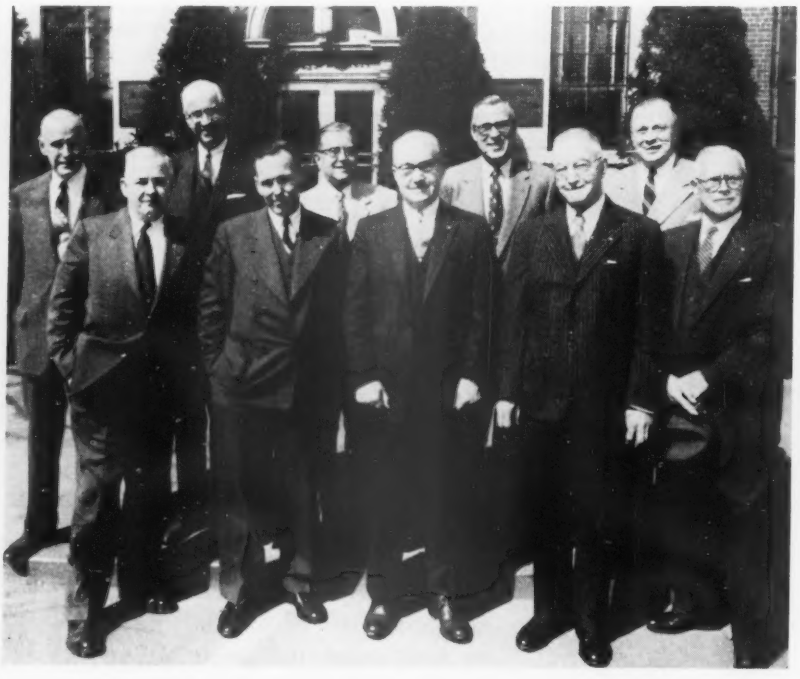
Use of the microscope in the study of sands was discussed by V. D. Frechette, New York State College of Ceramics, Alfred, N. Y., in his paper, **Microscopy and Molding Sands.** He said the microscope can be particularly useful in investigating grain characteristics, uniformity of mixing, agglomeration, segregation and metal penetration.

Use of Engineering Methods in Practical Sand Problems: Strength-Density Relationships was the subject of a paper by V. E. Zang, Unitcast Corp., Toledo, O., and G. J. Grott, which was presented by Mr. Grott. The authors described use of tensile and compression strength of molding sand to determine the shear strength, friction angle, intergranular friction, and intergranular pressure under different degrees of compaction providing different densities. From these data, separate evaluations of bond strength and integranular friction can be made for any given density of the sand. In turn, that information indicates the density beyond which additional compaction or ramming will be of benefit or lead to expansion defects.

At a subsequent session, Harry W. Dietert, Harry W. Dietert Co., Detroit, described an investigation of **Load-Carrying Power of Molding Sands.** This study was conducted in co-operation with Frank S. Brewster and Alexander Graham of the same firm. Method was to subject small cylinders of compacted sand to a constant load, and determine the deformation at definite time intervals.

At the final sand sessions, R. H. Greenlee, Auto Specialties Mfg. Co., St. Joseph, Mich., discussed **Core Room Practice Pitfalls** and H. W. Dietert, H. W. Dietert Co., Detroit, read **A Critical Analysis of the Cylindrical Standard Test Specimen for Foundry Sands** by Walter Goetz, George Fischer Ltd., Schaffhausen, Switzerland.

Two scheduled papers—**Reactions During Core Baking** by G. J. Grott, formerly of Unitcast Corp., Toledo, O., and H. F. Taylor, Massachusetts Institute of Technology, Cambridge,



100 SCHOLARSHIPS: Plans for use of the $50,000 grant made to the AFS last year by the Pangborn Foundation were completed at a recent meeting of executives of the Pangborn Corp. and officers of the AFS. The grant will provide over 100 scholarships at the secondary school level for qualified young men nominated by various society chapters as applicants of the awards. Ten successful candidates will be selected yearly, and each will receive a $500 scholarship applied as tuition in any accredited engineering college or university with foundry instruction. Present at the meeting were, left to right, front, William W. Maloney, AFS; Bruce Simpson, president, AFS; Thomas W. Pangborn, president, Pangborn Corp.; John C. Pangborn, first vice president, Pangborn; and P. J. Potter, vice president, Pangborn. Left to right, rear, are Lloyd L. Stouffer, vice president, Pangborn; Thomas Kaveny, director, AFS; Victor F. Stine, vice president, Pangborn; and Frank J. Dost and Collins L. Carter, most recent past presidents, AFS

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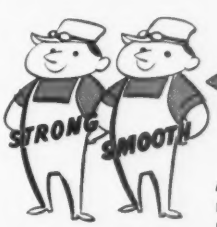

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Mass., and **Clay, Fines, and Water Relationships for Green Strength in Molding Sands** by A. H. Zrimsek and R. W. Heine, University of Wisconsin, Madison, Wis.—were not presented at the session.

Mr. Greenlee pointed out that many foundries operate corerooms without full realization of the importance of the department to economical production of quality castings. If a coreroom is to operate efficiently, these things are necessary: Thought and effort must be given to producing a quality casting so far as the casting is concerned, rather than producing a core to overcome certain coreroom problems. Dependable sources of quality raw materials must be established. Correct core sand mixtures, containing minimum amounts of raw materials, should be determined and maintained at all times.

Coreroom supervision should constantly be aware of raw material cost. Coreroom supervision should evaluate any new core sand mixture as to its purpose and effect on a casting, keeping in mind that the end product is the casting, not the core. Laboratory control of core sand mixtures should be a part of any coreroom plan to efficient operation. A good core scrap program should be established on a daily basis.

In his paper, Mr. Goetz presented a review of favorable and unfavorable remarks made in European foundry magazines about the suitability of the AFS cylindrical test specimen. It had been stated that the density in this specimen varied with the type of sands and moisture content. So it was thought the sands could not be tested under identical conditions.

It also was thought abroad that when the strength and permeability curves were plotted as a function of moisture content, their patterns were in contradiction to the "law" that permeability should run inversely and strength be proportionate to the change in density.

To show the individual effect of moisture and density, as well as the air space volume, on permeability and strength, a ternary diagram was used. It demonstrated the influence of air space volume, green and dry density on permeability. To maintain permeability at a constant level with increasing moisture, it is not essential for the air space volume to remain constant, but it can even decrease.

This diagram also shows that the strength and permeability curves are the result of the particular compaction method used for making the test specimens. So the pattern of curves obtained with the AFS method is only one of possible patterns obtainable with the same sand.

SAFETY and HYGIENE

WORKING CONDITIONS, as related to safety, hygiene, air pollution and dust control came in for consideration in three three-hour sessions.

The session on air pollution control featured reports on program activities, an introduction of working committee chairmen, a report on the air pollution control manual, presentation of two papers and a round-table discussion.

First paper, **Comparing Change in Emission Rate with Change in Metal Melting Rate (Hot and Cold Blast Operation)** was prepared and read by R. C. Ortgies, American Air Filter Co., Louisville. Generally, cupolas discharge 10 to 45 lb of particulate matter per ton of iron melted. About 33 per cent of the discharge is emitted during charging. Mr. Ortgies said that under average operating conditions a cupola operating at half capacity will give off 7 lb of dust per ton of metal melted; at three-quarters or full capacity it will discharge about 15 lb of dust.

Height of the cupola stack has an important effect on the amount of discharge. It acts as a combustion chamber. Best height for No. 8 to 12 cupolas is 35 to 40 ft above the charging door. Stack gas ignitors mounted at the charging door also help to reduce particle size and quantity of emissions.

Developments in Air Pollution Problems and Their Effects on the Foundry Industry, by George D. Clayton, George D. Clayton & Associates, Detroit, was the second paper. In discussing legal aspects of air pollution, Mr. Clayton said that the trend is for broader legislation, covering larger geographical areas. He anticipates state-wide control legislation, but feels that federal controls never will come.

He went on to say that knowledge is extremely limited on the health effect of industrial air pollution. In conclusion he stated that the public is demanding pollution control legislation, and good public relations procedure makes known industry's attempts to reduce air contamination.

The industrial hygiene and safety session consisted of two papers and two practical demonstrations. The first paper, **Noise and Its Control in the Foundry,** by H. T. Walworth, director, Industrial Hygiene, Lumberman's Mutual Casualty Co., Chicago, reviewed some of the technical factors of industrial noise exposures and some practical approaches to noise control. Legislation now is pending in several states to reimburse workers for loss of hearing resulting from continuous exposure to excessive noise.

Recent research on noise control indicates that 20 to 25 per cent of all industrial employees have lost some hearing through continued exposure in industry. The prospect that industrial loss of hearing may become compensable emphasizes the need for more activity in noise control. There is need for additional medical and engineering information before any real progress can be made, but knowledge now available, if used to advantage, can do much to protect workers exposed to excessive noise.

Mr. Walworth presented some basic principles of noise control and suggested that rapid progress would be made with this problem if these principles formed the foundation for a control program. These considerations are: Quiet the source; substitute (where possible) less noisy operations or machines; increase distance between source and worker; construct barrier between noise source and worker; reduce noise reflections by absorption; reduce exposure time and provide personal protection.

F. A. Patty, director, Industrial Hygiene, General Motors Corp., Detroit, offered a practical demonstration on noise control by showing how the noise of escaping compressed air can be muffled to an insignificant point. A double insulation with air space between walls appeared to be the best sound muffler. Layers of impervious material, with an air space between thicknesses, works better than a solid double thickness of material. Noise produced by metal falling on metal can be checked effectively by spot welds on chutes or sheets.

W. G. Hazard, Owens-Illinois Glass Co., Toledo, O., presented another practical demonstration on radiant heat and its control. Mr. Hazard

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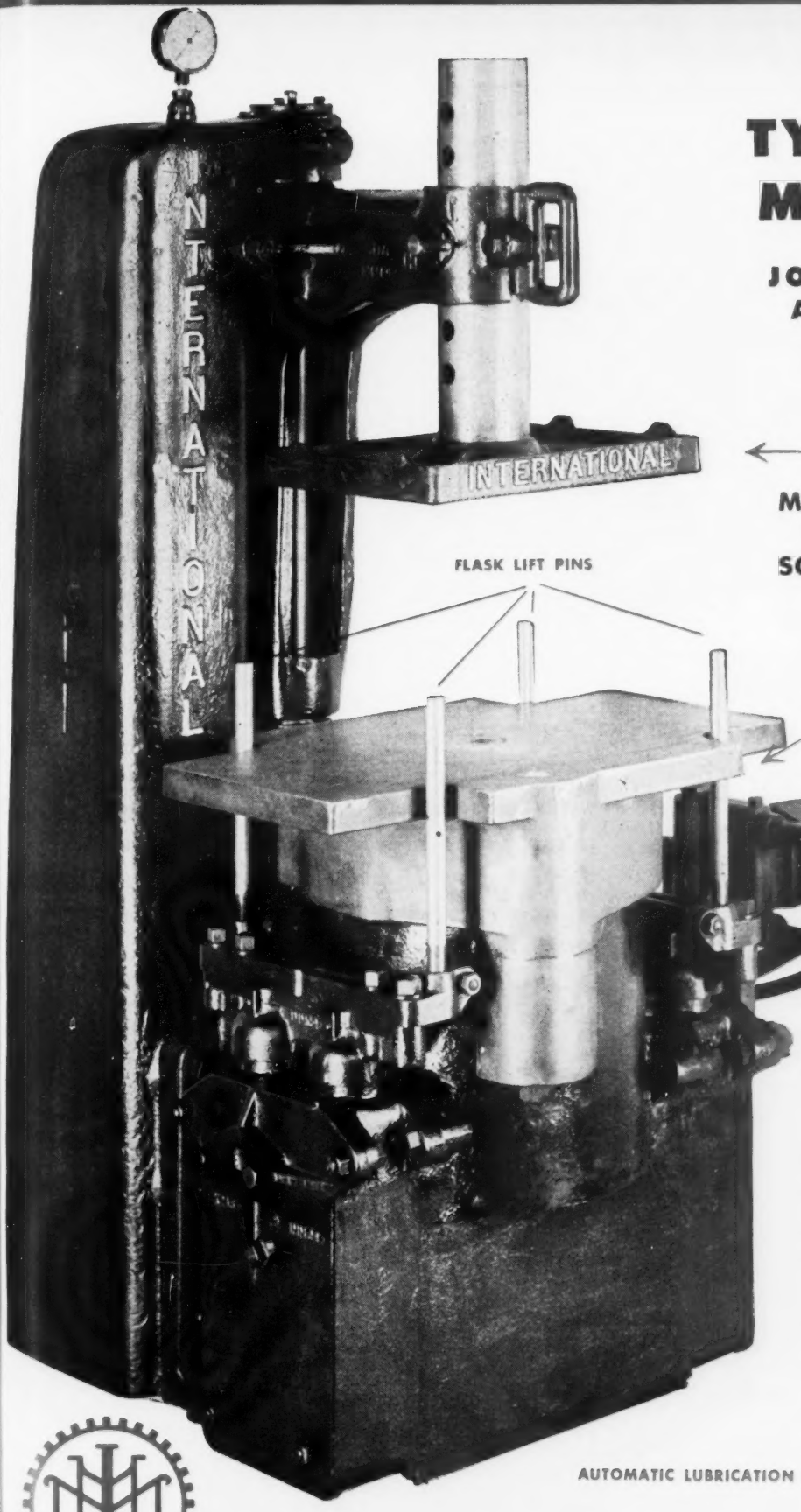

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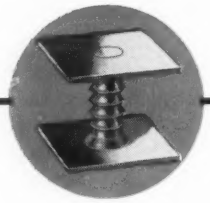

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showed the differences between effects of hot air and radiant heat as they might affect a worker. Radiant heat can fall upon a worker without the source being visible, as from a furnace and lights. Body absorbs radiant heat, so control problem is one of shielding the worker by blocking off the source. Various materials, such as metal both painted and unpainted, asbestos and glass, were used to show their degrees of effectiveness as shielding agents. Heat-reflective glass did a good job of blocking off infrared rays.

A New Theory for Grinding Wheel Failures, by W. H. Cox and D. C. Williams, Ohio State University, Columbus, O., was presented by Mr. Williams. The paper is a study of adhesion and cohesion of bonded granular masses and its formulas show that rupturing forces tend to begin at the center of the mass rather than at the periphery.

An interesting program was provided at a session devoted to dust control and ventilation. It was opened by John G. Liskow, American Air Filter Co., Inc., Louisville, Ky., who reviewed the status of the forthcoming AFS "Engineering Manual for Control of In-Plant Environment in Foundries."

The Dust Control and Ventilation Committee, which Mr. Liskow heads, was appointed two years ago and has issued one bulletin. An outline for the manual has been prepared and the work is proceeding step by step. Mr. Liskow's remarks set the stage and served as introduction to the two following speakers whose demonstrations probably were more convincing and eloquent than formal papers.

W. E. Tracy, Sturtevant Division, Westinghouse Corp., Chicago, used a working model to demonstrate **Effects of Inlet and Outlet Connections Upon Fan Performance.** He showed how a fan is connected in a laboratory and used to provide data for performance curves on power air pressure and air volume. Throughout the demonstration, the audience was able to observe how fan performance and efficiency are affected when air inlets in duct work are obstructed or air flow is otherwise altered or impeded.

Mr. Tracy stated that the trend toward streamlined mechanized foundry operation emphasizes the necessity of re-evaluating accessory equipment. The increased speed of the operations has created additional problems not considered important when production was limited. Some occupational hazards incident to normal foundry practices have been multiplied. The fan industry has been keeping abreast of the changing times and the present-day industrial exhauster is a far cry from previous models.

However, the speaker continued, application of a fan to a system of duct work requires careful consideration on the part of the foundry engineer and the fan supplier. A complete exhaust system consists of two elements or components, and a thorough understanding of each is necessary to be sure that the final results will be obtained.

In the second demonstration, Kenneth Robinson, General Motors Corp., Detroit, used two models scaled down from a good and a bad duct system to show **Duct Work Efficiencies.** The bad system featured mitered elbows, poorly designed blast gates and duct sizes carelessly adopted. The good system was an engineered one in every respect and had curved elbows.

The two systems were comparable insofar as air volume was concerned. Significant, therefore, was the fact that static pressure of the bad was four times that of the good, and horsepower required for the former was about four times that for the latter. It was pointed out that these ratios increase greatly when the capacity is boosted.

It was obvious that the poor system would cost more to install and to operate, which prompted Mr. Robinson to pose the question as to whether management wants to pay for engineering once—when a system is designed and built—or every day through inefficient performance.

In the discussion period it was brought out by Mr. Robinson that poorly designed systems load up and require constant cleaning since such loading causes inefficient operation.

HEAT TRANSFER

THE Heat Transfer Forum, presented in two sessions, was dedicated to the memory of Dr. H. A. Schwartz, National Malleable & Steel Castings Co., Cleveland, who was chairman of the Heat Transfer Committee from its inception in 1944 until 1952.

In a statement of dedication, Dr. W. K. Bock of National Malleable pointed out that Dr. Schwartz was vitally interested in reducing foundry practice to a science. He realized that this could not be done by solving a series of shop problems as they arose, because the interest in those problems is transient and their solutions leave little residue of knowledge with which to build a science. Despite the fact that some of his contemporaries criticized his work as too theoretical, Dr. Schwartz devoted his energies to seeking out fundamental principles and applying them to generalized problems. Dr. Bock pointed out that Dr. Schwartz recognized the importance of this application in his own work and spent much of his time assisting in the transition to production problems.

In discussing **Range of Effectiveness of Chills,** Victor Paschkis, Columbia University Heat and Mass Flow Analyzer Laboratory, New York, explained that the data were determined by a mass flow analyzer, a large-scale computing device. The study is a continuation of work carried out in co-operation between the AFS and Columbia University over the last ten years. The work on chills was done on a steel slab, large enough to discount edge effects. Two cylindrical disks were applied, one to each of the opposing poles of the slab. The effectiveness of chills decreases from center to edge of the chill.

Results were presented in generalized form so as to be independent of the thickness of the slab. Ratios of dimension "chill diameter; chill thickness; slab thickness; radial distance (measured from the center)" were plotted in their natural relationship with freezing time.

Feeding Range in Shell Molds, a paper by R. E. Morey, H. F. Bishop and William S. Pellini, Naval Research Laboratory, Washington, was presented by Mr. Pellini. In the work reported, the riser feeding in shell-molded plate castings of eight different alloys was investigated by radiography of transverse sections. The exact feeding ranges could be determined by this technique only for those alloys which develop centerline shrinkage, namely steel, manganese bronze and nodular iron.

The tests indicate that realistic feeding range values for bronze and aluminum alloys which solidify with the presence of dispersed porosity can be determined by means of specialized hydraulic pressure testing. Gray iron, because of the time and mode of graphite formation, is self-feeding, and feeding range is essentially infinite in uniform sections.

It was the conclusion that the dif-

ference in heat transfer characteristics of conventional sand molds and shell molds apparently is not sufficiently great to affect feeding ranges. Therefore, it was assumed that the formulas developed for feeding ranges in sand cast steel bars, joined sections, padded sections and chill sections are applicable to shell mold castings without modification. Spot checks on other alloys have indicated no significant difference in feeding characteristics resulting from the two mold media.

In discussing **Risering Requirements of Nodular Iron,** R. C. Schnay, Physical Metallurgical Division, Mines Branch, Department of Mines and Technical Surveys, Ottawa, Ont., stated that the formation and growth of free graphite produces an expansion during the solidification of either nodular or gray iron. In gray iron this expansion can be taken up by movement of the liquid metal. In this way gray iron castings tend to be self-feeding, and heavy risers are seldom required. The process of self-feeding does not occur to any appreciable extent in nodular iron, and therefore large risers are necessary. In fact, some nodular iron castings may require larger risers than the same castings in steel.

The report presents data on a series of test castings made to compare the risering requirements of steel, gray iron and nodular iron. Radiographs serve to illustrate the heavy requirements of nodular iron castings. In addition, it was noted that, due to the limited self-feeding of nodular iron, center-line shrinkage is a definite problem and the feeding distance of the section must not be exceeded if a sound casting is to be produced.

The concluding paper at the first session was on **Heat Transfer Problems in Aluminum Permanent Mold Castings** by W. A. Mader, Oberdorfer Foundries Inc., Syracuse, N. Y. Mr. Mader stated that heat transfer problems are encountered in all casting processes. Because of certain factors linked with present permanent mold practices, proper solution of these problems becomes especially important in the production of satisfactory aluminum castings. Factors affecting the heat transfer from the solidifying aluminum casting to the permanent mold include pouring temperature and method; casting design; mold material, design and temperature; gating and risering design; mold coatings and cycling.

All factors considered, the lowest possible pouring temperature is desirable. The greatest single factor affecting pouring temperature is casting thickness. While a thickness of 1 to 8-in. minimum is preferred for walls of a permanent casting, thinner sections may be run over relatively small areas by the use of special methods. Various pouring methods have advantages, but it is unfortunate that as the methods become more complex, higher casting costs usually result so that the methods are restricted to special types of castings.

Thin-section castings have higher thermal gradients than thick sections; the molds absorb less heat and the cycling rates are higher, and the castings exhibit higher physical properties. Abrupt changes in section thickness increase casting difficulties. Higher mold temperatures produce lower physical properties and lower cycling rates. Therefore, attention must be directed to satisfactory heat extraction from the molds. Molds have been produced from numerous materials, but it has been found that a fine-grained, high-carbon cast iron which has undergone stress relief treatment is most successful and is used to produce the majority of aluminum castings.

Generally the material is cast to rough shape and the cavity, including the gating system, parting and mold cavities are machined to necessary dimensions. Actually, from the viewpoint of heat transfer, the composite mold is most desirable, consisting of materials of variable conductivities and heat capacities to control thermal gradients and produce controlled directional solidification in the casting. Mold coatings are necessary to provide adequate casting surface finish. In conclusion, the author stated that organized research on heat transfer problems in permanent molds should provide data that will assist the designer to develop more efficient molds and the permanent mold operator to produce better castings more efficiently.

Four papers were presented at the second heat transfer session. The first, **Application of Heat Transfer to Hot Tearing,** was by J. B. Caine, Cincinnati. The speaker presented examples of the application of heat transfer data to hot tearing. He stressed the fact that temperature gradients at the edges of chills do not decrease as the chill thickness decreases in relation to the casting section chilled. It has been found that temperature gradients are steeper with chills one-eighth to one fourth as thick as the casting section than for chills with sections equal to the casting section.

Steep thermal gradients at the edges of chills can be eliminated by coating the chill with wash. Coating can be as thin as $\frac{1}{32}$-in. for casting sections of 1 in. The coating does not affect over-all chill effectiveness. He also mentioned that hot tears, which occur at sharp corners, can be eliminated by rounding the corners.

Application of Indirect Chills by Charles Locke, Westlectric Castings Inc., Los Angeles, was the second paper. Several case history castings were tested and discussed to clarify the principles of indirect chilling. Such chills are used at surface hot spots in the mold caused by pockets of confined hot sand in corners, fillets, re-entrant angles and for controlling solidification rates.

Indirect chills are covered with sand or a wash so they do not contact the casting surface. Sometimes it is difficult to get sand to stick to the chill. One foundryman commented that he had success in getting sand to stick by coating the chill with sodium silicate and then covering the chill with a sodium silicate-sand mix and applying CO_2 to harden the sand on the chill.

The third paper, **Application of Insufficient Chills,** by E. C. Troy, Riverton, N. J., was read by E. A. Zeeb, Dodge Steel Co., Philadelphia. The paper pointed out that a chill is sufficient when it causes solidification of the casting in an optimum amount of time.

Charles W. Briggs, Steel Founders' Society of America, Cleveland, concluded the session with his paper, **Risering of Commercial Steel Castings.** Mr. Briggs based his paper on previous heat transfer studies as they apply to risering and presented a method for practical application of known information to the risering of production castings.

Casting sections fall into the general shapes of spheres, cylinders, squares, bars and plates. Data on solidification time of various sizes in these shapes are used in determining proper riser sizes. Calculations also must include the casting volume and distance the riser must feed. Both

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riser shape and size are important. Riser freezing time is governed by its diameter and its volume by the height.

The calculation method outlined by Mr. Briggs develops a riser with width equal to height. In conclusion, the speaker suggested use of a pipe eliminator compound on top of risers as a further aid to proper feeding.

BRASS SHOP COURSE

IN TWO shop course sessions dealing with brass and bronze, the topics discussed included molding and melting equipment and shell molding.

At the first session C. V. Nass, Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago, talked on **Molding Equipment for the Brass Foundry,** and stated that use of such equipment to obtain improved quality and lower cost is just a matter of economics. The high cost of labor requires that it be used as efficiently as possible and through use of suitable equipment an increase of 15 per cent in production may be obtained. Since no two foundries are alike, selection of proper equipment can be made only through correct analysis of individual conditions.

Material handling is almost as important as the molding machine, and should be considered in making a decision. At the conclusion of his discussion, Mr. Nass presented a short motion picture showing various types of mold blowing and squeezer machines.

In the absence of Harold J. Roast, Ottawa, Ont., who prepared a paper on **Melting Equipment for the Brass Foundry,** Tom Gregory, Bohn Aluminum & Brass Corp., Detroit, gave a brief resume. According to the author, the selection of the furnaces essentially depends upon the fuel and money available and the quality of the melt desired. With careful attention to melting practices most furnaces give satisfactory results.

At the second session, about 170 persons heard a paper on **Dimensional Tolerances and Surface Structure in Various Shell Cast Metals,** by Richard A. Flinn, Walter B. Pierce and Floyd R. Smith, University of Michigan, Ann Arbor, Mich., and Paul F. Youngdahl, Mechanical Handling Systems Inc., Detroit. Mr. Flinn presented the paper.

HS-31 alloy, 85-5-5-5, 4140 steel, soft automotive gray iron and nodular iron were poured into step-bar shell molds (1/16 to 2 in. gradations) of resin-bonded and synthetic sands. Brass alloy was melted in clay-lined crucible, others were melted in a basic-lined, high-frequency induction furnace. Pouring was horizontal with shells backed by gravel. A roughness indicator provided a measure of surface finish.

Charted data gave some indication of tolerances that could be held in the cope, in drag and across the parting line as well as a check upon surface quality. It was discovered that the surface qualities of the HS-31 and gray iron were best in the thinner sections. There was an apparent reaction of steel with the mold, and the heavy sections were rough. Brass surfaces were rough from penetration. No great effect was evident on any of the metals when resin content of mold was varied between 4 and 12 per cent.

Mr. Flinn indicated that the research was performed about one and one-half years ago and better results could be obtained today because of improved clamping techniques and better quality resins developed through intensified research.

GRAY IRON

FIRST of five technical sessions on gray cast iron related to gases in the metal. **Oxygen Content of Gray Cast Iron Increases with Time** by R. C. Williams and H. W. Lownie Jr., both of Battelle Memorial Institute, Columbus, O., was presented by Mr. Lownie, and reported an investigation of four different irons to determine the oxygen content at intervals of time up to one year from the time of pouring.

Results showed that the oxygen content, as determined by vacuum-fusion analysis, increased with time, and the amount and rate of absorption were dependent upon the structure of the graphite flakes connected to the surface of the iron. These conclusions were based on data from nodular iron which absorbed little oxygen in comparison with flake-graphite irons.

In the discussion, the suggestion was made that further information on the mechanism of oxygen absorption might be obtained by machining 1/16-in. from the surface and analyzing the piece, casting specimens against a chill, and maintaining the specimens in dry air between analyses. In reply to a question it was stated that iron with fine graphite flakes absorbs less oxygen than that which contains coarse flakes.

In the absence of W. Y. Buchanan, John Lang & Sons Ltd., Johnstone, Scotland, who prepared a paper on **Dissolved Gas in Liquid Cast Iron,** it was summarized by R. A. Clark, Electro Metallurgical Co. Division, Union Carbide & Carbon Corp., Detroit. The author used a cast iron bell with the edge just under the surface of molten iron to collect gases, which were measured and analyzed. The author found differences in amount and composition of the gases in irons of different compositions melted in different cupolas and subjected to after treatments such as iron oxide, soda ash.

Second gray iron session was concerned with injection methods for gray iron. **Calcium Carbide Desulphurization by the Injection Process** by J. A. DeHuff, Air Reduction Research Laboratory, Murray Hill, N. Y., and Richard Schneidewind, University of Michigan, Ann Arbor, Mich., was presented by Mr. Schneidewind. Results obtained indicate that the practice is an easy, clean method for desulphurization with rapid reaction and rate of clearing the waste products. Efficiency is better with high sulphur values. Desulphurization can be accomplished at temperatures as low as 2300 to 2400° F, but higher temperatures are preferable. Calcium carbide injection with nitrogen carrier gas does not change the nitrogen content of the iron.

Increasing Carbon Content of Cast Irons by Ladle Injection by G. E. Spangler, Air Reduction Research Laboratories, and Richard Schneidewind was discussed by Mr. Spangler. In the study, various types of carbonaceous material were injected into molten cast iron, and it was found that the best results were obtained with electric furnace graphite. Indications are that up to 0.48 per cent C can be picked up in less than four minutes in a 2000-lb ladle at a temperature of 2600 to 2700° F with a recovery of about 50 per cent. With deeper immersion of the injection nozzle and higher temperatures, high-

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Carbon-injected irons behave as normal gray irons with respect to tensile strength-brinell hardness-composition relationship, and are equivalent in strength to inoculated irons. The irons have a lower chilling tendency, and completely pearlitic matrixes have been produced with brinell as low as 143. The latter is of interest where easy machinability and wear resistance are desired.

Concluding paper, **New High Strength Cast Irons Produced by Injection Methods** by J. W. Estes, Air Reduction Research Laboratories and Richard Schneidewind was presented by Mr. Estes. It described work on injection of calcium carbide in combination with magnesium oxide and rare earth metals, with rare earth metals, and with metallic magnesium. Data obtained show that the first two produce cast irons with as-cast tensile strengths of about 50,000 psi or above. These are intermediate between gray iron and nodular iron. The irons possess ductility, high strength, insensitivity to cooling rate in various section sizes, low hardness and machinability. Use of magnesium metal powder with calcium carbide and rare earth metals gave consistent and highly effective upgrading and nodulizing of iron in both acid and basic ladles and over the practical range of cupola iron temperatures.

Upgrading and machinability were subjects discussed at the third gray iron session. **Fluidization-Injection Process for Desulphurizing and Upgrading Cast Iron,** the first paper, discussed the injection of calcium carbide into molten iron for the purpose of reducing sulphur content and improving physical properties of the iron through transformation of the shape of the free graphite. Prepared by G. P. Dahm, H. C. Barnes and C. E. Bieniosek, Linde Air Products Co., division of Union Carbide & Carbon Corp., Newark, N. J., the paper was presented by Mr. Barnes.

The speaker pointed out that while the desulphurization process is not a cure-all, it can be of considerable benefit to those foundries producing specialty or high-strength castings. It helps in meeting specifications, reduces the necessity for premium furnace charge materials, decreases chill and forms a desirable type of reaction slag. The process was described as particularly advantageous to foundries producing nodular iron, offering production economies, better production control and cleaner finished products. The upgrading process is now applicable to a wide variety of cast irons; future development work will seek to broaden these applications.

Machinability Testing — Relation Between Cutting Temperature and Tool Life for Gray Irons, by E. A. Loria, Crucible Steel Co. of America, Pittsburgh, and D. R. Walker, Massachusetts Institute of Technology, was presented in the absence of the authors by E. A. Brandler, Electro Metallurgical Co., Birmingham. This study shows that cutting temperature and forces can act as a guide in evaluating relative tool life under given operating conditions. Measuring cutting forces and temperatures saves considerable time compared with that required for a wear test.

The final paper, **Developments in the Light Castings Industry,** was the official exhange paper from the Institute of British Foundrymen. It was prepared by S. M. Jeffrey, Federated Foundries Ltd., Manchester, England, and was presented by title only. Mr. Jeffrey's paper discusses various developments in England in the production of small castings. It includes a description of the permanent mold casting of half-round iron drain gutters 6 ft long. In this process iron is poured into a female die. A male die is closed over it long enough to form the casting, solidifying it without chilling.

The fourth gray iron session included three papers. The first, **Nickel Austenitic Ductile Irons,** was by Fred G. Sefing, International Nickel Co., New York. These are a group of magnesium-containing irons which also have up to 24 per cent nickel and usually appreciable amounts of manganese and chromium. The austenitic irons have high strength and toughness and resistance to heat, corrosion and rubbing wear. They also have good castability, machinability and other manufacturing advantages. According to the speaker, they are suited for use in the process industries, furnaces and power units.

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Theory of Nodular Graphite Formation in Ductile Cast Iron by Paul H. Anderson, South Dakota School of Mines and Technology, Rapid City, So. Dak., was the second paper. It presents a hypothesis which considers the effect of surface energies involved in graphite nodule formation from carbon rejected from the iron melt and proposes that crystallization of graphite nodules occurs from the graphite-metal interface toward the nodule center.

Carbon from the unstable, undercooled liquid precipitates as a cloud of minute platelets a few angstrom units across and one carbon atom thick. The platelets first behave as flat carbon molecules and are not wetted by the melt, thus permitting them to agglomerate into spherical masses. Crystallization occurs at, or just under, the eutectic temperature in three-dimensional form. X-ray diffraction studies show imperfections in the graphite crystals after the melt solidifies. Prolonged annealing just under the eutectic temperature decreases these imperfections by allowing consolidation of the graphite.

Third paper, **Hardenability of Ductile Cast Iron,** by C. C. Reynolds, W. T. Whittington and H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass., was presented by Mr. Reynolds. Hardenabilities of different composition ductile irons were measured and a method for calculating hardenability from chemical composition presented. Hardenabilities of ductile iron and steel were compared, and relations between hardenability, section and severity of quench were established.

Conclusions indicate that when carbon and grain size only are considered, ductile irons possess higher hardenability than plain eutectoid steels. Also it appears that austenitic grain size of ductile irons is not an important factor in hardenability.

Generally, the effects of alloying elements on hardenability of ductile irons are similar to their effects on steels and are the product of amount present. Exceptions are that 1) phosphorus reduces hardenability, 2) powers of the different alloys differ in the two metals, 3) silicon, to about 3 per cent, increases hardenability and above this amount decreases it, and 4) large amounts of alloys are less effective in ductile irons than in steels.

Three papers were presented at the concluding gray iron session. **Risering of Nodular Iron** by R. C. Shnay and S. L. Gertsman, Department of Mines and Technical Surveys, Ottawa, Canada, was presented by Mr. Shnay. This is part two of a paper dealing with effect of silicon content on feed-

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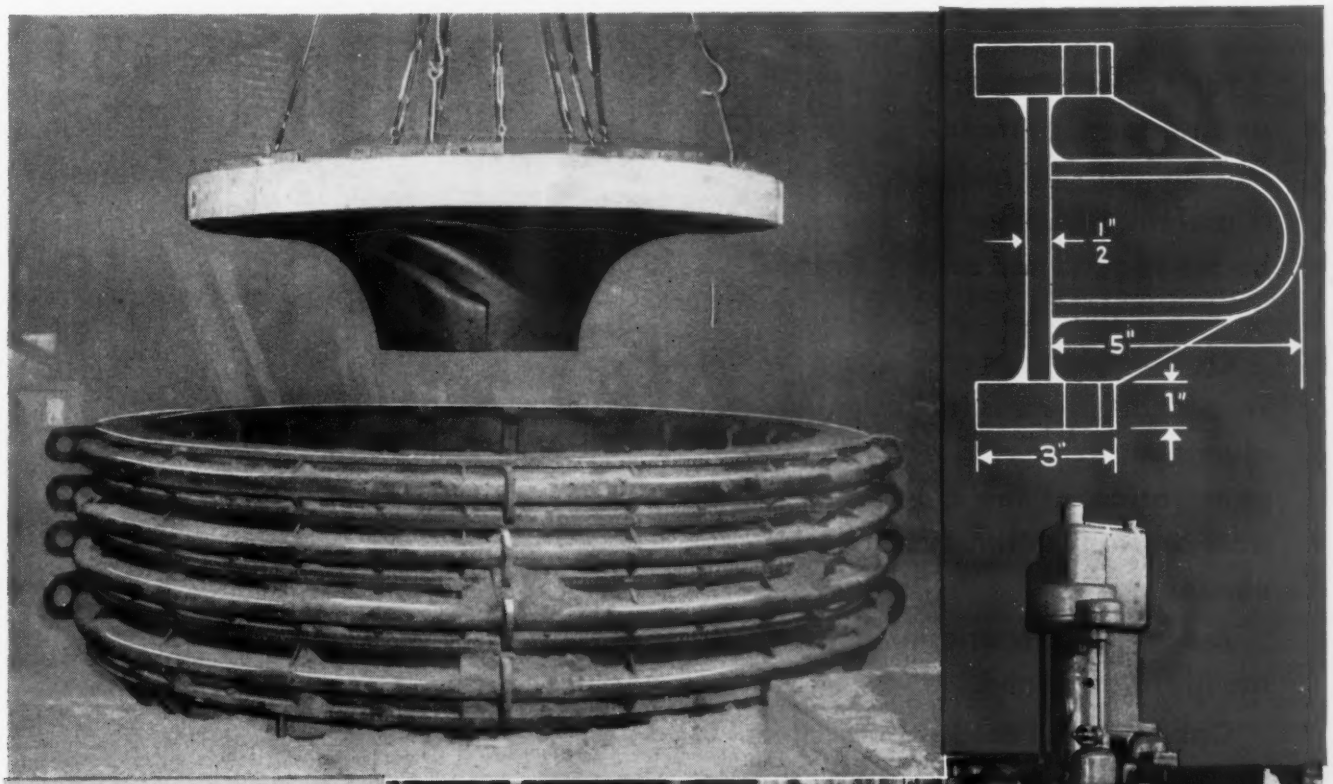

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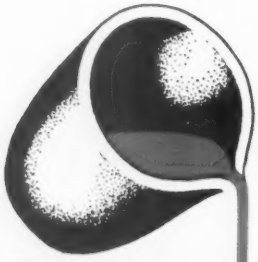

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ing distance. The first part was presented at last year's convention. Iron reported on in the second paper had average silicon contents of 2.46, 2.71 and 2.99 per cent in the three ranges. The two higher-silicon-content irons had about the same feeding distances. The low-silicon-content iron consistently had a shorter feeding distance. Heats in the higher-silicon irons were hypereutectic; low silicon heats were hypoeutectic.

It was concluded that variations in silicon content from 2.57 to 3.13 per cent do not affect appreciably feeding distance of hypereutectic nodular irons. Hypoeutectic nodular iron plates ½ to 1½ in. thick have a shorter feeding distance than hypereutectic nodular iron plates of equal thickness.

The second paper, **Risering of Ductile Cast Iron—Riser Dimensions, Feeding Distance, and Other Data,** by R. A. Flinn and W. A. Spindler, University of Michigan, Ann Arbor, Mich., and D. J. Reese, International Nickel Co., Bayonne, N. J., was presented by Mr. Flinn. The paper points out that two principal factors govern production of sound ductile iron castings. They are riser size and placement. The riser must freeze last and the connection between riser and casting must stay open until the casting has solidified.

Freezing ratio of casting to riser may be found by dividing the surface area of the casting by its volume and dividing the remainder by the surface-volume ratio of the riser. The answer must be greater than 1 because the cooling rate of the riser must be less than that of the casting. Further adequacy of the riser is determined by calculating volume ratio of riser to casting to insure that sufficient metal is available to take care of liquid-to-solid shrinkage.

Riser placement depends on the effective feeding distance of a riser in a particular casting. The following formulas indicate feeding distance in simple plates and bars; data may be projected for more complex shapes: Thickness of plates and bars is shown by t. Feeding distance for plates equals $4\frac{1}{4}t$ (applies to ¼ to 2-in. sections). For bars it is 6t (applies to 2 to 4-in. sections).

Discussion brought forth the point that freezing ratio is based on calculations of theory. Practically, shapes vary and ratios might better be determined by measuring temperature differentials by thermocouple. Mr. Flinn stated it is not necessary to measure temperatures, and he was substantiated by additional comment that the effect of temperature on feeding distance is not known. No researcher has done work on that subject.

Additional comment claimed that volume-surface ratios may be satisfactory for large castings, but the freezing of small castings is influenced greatly by pouring time. Thus gating methods are important. Research assumes instantaneous filling of the mold cavity.

The concluding paper, **Risering of Gray Iron Castings,** is report No. 6 of the AFS-sponsored research project and was written by E. F. Sullivan Jr., C. M. Adams Jr. and H. F. Taylor, MIT. It was presented by Mr. Adams.

Objective of work presented in the paper was to confirm data obtained in previous work and to collect new and more practical data using improved apparatus. The new work supports and extends the previous data. It showed that carbon is more effective than silicon in reducing total shrinkage. The measured effect of silicon on total shrinkage is less than that predicted theoretically.

Shrinkage is related to the structure as well as amount of graphite. High-sulphur or phosphorus irons have a finely dispersed graphite structure and have less shrinkage than coarse-graphite-structure irons. To a lesser extent manganese reduces shrinkage and refines graphite.

Increased supercooling has been associated with increased measured primary and total shrinkage, late precipitation of graphite, coarse graphite structure and, probably, increased mold dilation. Also, high-silicon, low-carbon eutectic irons shrink whereas high-carbon, low-silicon eutectic irons expand.

And, finally, theoretical relationships presented in the 1954 report have been simplified to linear functions of carbon and silicon contents.

By way of introduction at the Gray Iron Division roundtable luncheon, J. S. Vanick, International Nickel Co. Inc., New York, and chairman of the division, reviewed its activities during the past year.

Principal speaker was William G. Ferrell, Auto Specialties Mfg. Co., St. Joseph, Mich., with the intriguing subject **Success for Castings = Design + Quality.** The automobile industry welcomes the assistance of foundrymen in the design and production of its castings, it was emphasized. Having an open mind and always seeking better functional performance of its cars and components, this industry is quick to make changes when this end can be served. To illustrate, Mr. Ferrell hinted at a new development in which the auto industry is adopting gray iron in a large tonnage way for certain important castings which heretofore have been exclusively of another metal.

Adding weight doesn't make a cast part better, the speaker warned. Today, design frequently makes castings lighter. He cited an instance in which 0.03-lb removed from a small automotive casting improved machining. That development didn't lose business for the foundry—it increased it.

Making of castings has few limitations, Mr. Ferrell emphasized. The designer is the limiting factor. The foundryman frequently must bear the cost of design work, this to demonstrate to the customer that a casting can be made. According to the speaker, this procedure begets confidence and the next time the customer has a problem he will come back for help. Discussion of Mr. Ferrell's remarks developed the point that a casting can be made to almost any tolerance a customer is willing to pay for.

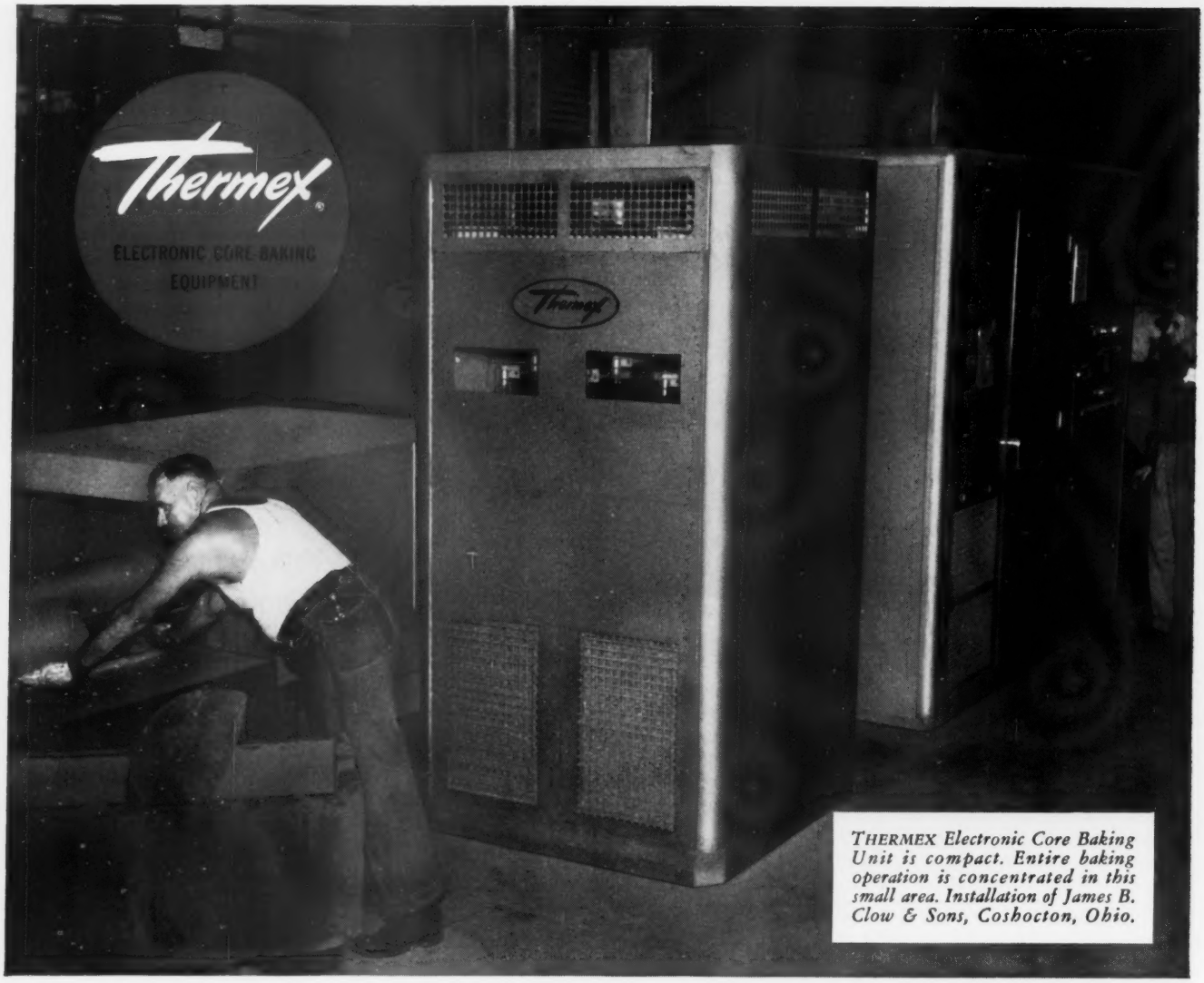
FOUNDRY COSTS

THE AFS Foundry Cost Committee sponsored one session at which two papers on management subjects were presented.

The first paper, **Modern Management Control,** was given by Roger K. Dailey, vice president, Lester B. Knight & Associates Inc., Chicago. Mr. Dailey elaborated upon and showed slides of several daily, weekly and monthly accounting statements containing information for management controls by reporting actual operating costs in comparison with established standards.

The statements are designed to pin-point all variations from standard so management can make adjustments where necessary to maintain proper profit-and-loss relationships. Information provided also aids correct pricing, portrays the effect of volume, shows break-even points and gives management a tool for control of a variety of jobs in terms of sales profitability.

Speaker stated that the recommended statements do have a place in modern cost procedures and when used properly can serve as a help to



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management in keeping abreast of variables and the amount of control necessary to maintain desired balances.

The second paper, **Management Task in a Competitive Economy,** was delivered by L. L. Ellis, partner, Booz, Allen Hamilton, Chicago. Mr. Ellis stated that in today's competitive economy, skilled executive ability is the country's scarcest commodity because our rapidly expanding economy has become increasingly complex, and today's executives generally have not "grown" as fast as have their companies. According to the speaker, too much executive time is devoted to operating details that should be delegated to subordinates.

Mr. Ellis suggested that the growth of many companies would be helped considerably if top executives applied their thinking to the functions of progress. These were listed as: Determination and definition of the basic objectives and policies of the company; development of specific long-range plans for attainment of the stated objectives; development and implementation of the organization plan best suited to accomplish these objectives; provision and effective utilization of capital required to implement the long-range plans; development and improvement of the products or services of the company and development and training of executive replacements.

The paper concluded by stating that a company has a solid foundation on which to build its future when its objectives are well defined and its long range plans are carefully developed, when its organizational structure is flexible and sound, producing a progressive product line behind adequate capital backing. Add to this well trained and constantly developing executives and the future of the company should be prosperous and secure.

Editor's Note: See the July issue for reports on sessions devoted to Education, Refractories, Gray Iron Shop Course, Plaster Molding, Malleable Iron, Sand Shop Course, Brass and Bronze, Patternmaking, Plant Equipment, Industrial Engineering, Light Metals and the Carbon Dioxide Process.

AMA Issues Personnel Book

American Management Association has released booklet 159 in its personnel series, "Personnel Management In a Competitive Economy," with a section on employee education and community relations. Also included are three papers on related subjects: "Overhauling Employer-Employee Relations," "Training for a Competitive Management" and "The Dollar-Getters and the Cost-Cutters: Selecting Tomorrow's Key Executives."

Copies are available from the association, 330 West 42nd St., New York 36. Price is $1 to members, $1.75 to nonmembers.

Film on Dye Penetrant Inspection Is Offered

A 23-minute, 16-mm sound-color motion picture is offered by Turco Products Inc., Los Angeles. "Flaw Location with Dye Penetrants" visually demonstrates every aspect of dye penetrant inspections from laboratory theory to authentic production-line techniques, all filmed on location during mass production dye penetrant inspections.

Laboratory sequence describes the theory behind dye penetrants in detail and outlines proper methods of assuring complete inspection accuracy. Laboratory inspection is performed on glass micro-slides fastened together to simulate a defect, enabling the viewer to see exactly what action takes place when flaws are located in metal parts with dye penetrants.

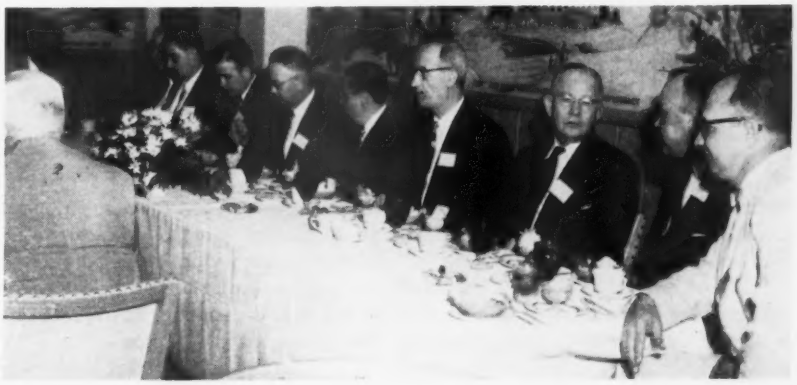
Arrangements for viewing the film or additional information may be secured by writing to Turco Products, 6135 South Central Ave., Los Angeles 1. Field service representatives of the company are available in all sections of the country to show the film.

Society Publishes Directory

Steel Founders' Society has published the 1955 edition of its *Directory of Steel Foundries.* It contains the latest obtainable information of steel foundry personnel, production facilities, processes employed, capacities and other information. Producers of heat and corrosion steel castings, high manganese castings, investment mold castings and tool steel castings also are included.

Copies may be ordered at $10 each from the society, 920 Midland Bldg., Cleveland 15.

NFA REGIONAL MEETINGS: The National Foundry Association held its first regional meetings in Chattanooga and Birmingham on May 11 and 12. Chairman at Chattanooga was Paul L. Arnold, resident manager, U. S. Pipe & Foundry Co., and vice president of the NFA, A. J. Fruchtl, resident manager, U. S. Pipe & Foundry Co., was chairman at the Birmingham meeting. Featured speaker on each occasion was James I. Poole, labor attorney, Fairchild, Foley & Sammond, Milwaukee. Mr. Poole discussed "Critical or Crisis Bargaining" and outlined approaches to collective bargaining used by some of the leading foundries in the nation. Left to right, above, at the Chattanooga meeting, are Coy Jones, O. W. Walker, Leroy Downs, H. M. Barker, H. Wilson and J. Hornsby. Below, left to right, at the Birmingham meeting, are Lew Durdin, J. W. Brennan, R. Voight, C. T. Sheehan, A. J. Fruchtl, James Poole, Paul L. Arnold, C. Hagler, B. Warren and E. J. Warwick



Industry BRIEFS

T. H. BENNERS & CO., Protective Life Bldg., Birmingham 3, is handling sales of molding sand for the Ayers Mineral Co., 806 Market St., Zanesville, O., in Mississippi, Alabama, Georgia, South Carolina and Florida. Aubrey M. Garrison represents the Benners company. Since early this year C. Eugene Silver has represented Ayers Mineral in Texas, with headquarters in Houston.

Selas Corp. of America, Philadelphia, has started work on a new $1 million plant on an 11-acre site at Dresher, Pa., 22 miles north of downtown Philadelphia. The new buildings will almost double the firm's present floor space, and the site will contain room for future expansion. Selas manufactures automatic heat treating, brazing and other heat processing equipment.

Claud S. Gordon Co., Chicago, has completed an addition to its plant at Richmond, Ill. The addition will double its facilities for the production of thermocouple wire, pyrometers and pyrometer and thermocouple accessories.

Thew Shovel Co., Lorain, O., has acquired the plant and inventory of Byers Machine Co., Ravenna, O., for a little over $900,000 and has formed a new subsidiary corporation, Byers Machine Inc., to operate the plant in Ravenna. Byers operates a foundry.

Reed-Prentice Corp., Worcester 4, Mass., has opened a branch office at 1213 North Highland Ave., Los Angeles, to handle sales of its plastic injection molding and die casting machines. Robert W. Carr will manage the new West Coast sales office. Working out of a new Buffalo office at 2 Lockwood Lane, Orchard Park, N. Y., C. W. Kendall will cover the western New York and Pennsylvania territories.

American Pulley Co., Philadelphia 29, has acquired from Standard Pressed Steel Co., Jenkintown, Pa., the rights, tooling, equipment and inventory for its line of pressed-steel platform trucks. American Pulley recently acquired Safeway Industrial Equipment Corp., Chicago, producer of hydraulic lift trucks. All new manufacturing operations will be consolidated at Philadelphia.

General Electric Co., has opened a new apparatus service shop at 2809 North Robertson St., New Orleans. It will supplement repair and maintenance service in that area formerly handled at Atlanta. E. A. Woniger, formerly with the Atlanta service shop, will operate the new facility under direction of H. P. Hauck, manager in Atlanta.

Mechanical Devices Inc., Detroit 36, Mich., has purchased the assets of the Peabody Industrial Co., manufacturer of a portable hardness tester. Mechanical Devices will handle all manufacturing and sales of the new addition to its precision line of testing devices.

Automatic Transportation Co., Chicago, has appointed IMC Equipment Inc., 1327 Spring St., N.W., Atlanta, its representative for Georgia. R. L. Warwick, president of IMC, will supervise sales and service operations, assisted by R. B. Fogarty, J. T. Fulwiler Jr., and William Chapman.

Pacific States Cast Iron Pipe Co., Provo, Utah, plans expansion and modernization of its valve and hydrant plant there, to cost $1½ million. Company is a subsidiary of McWane Cast Iron Pipe Co., Birmingham.

Nelmor Mfg. Corp., Euclid, O., has granted Sparklets Ltd., Division of British Oxygen Co., London, Eng., a franchise for European rights to its exclusive vacuum die casting process.

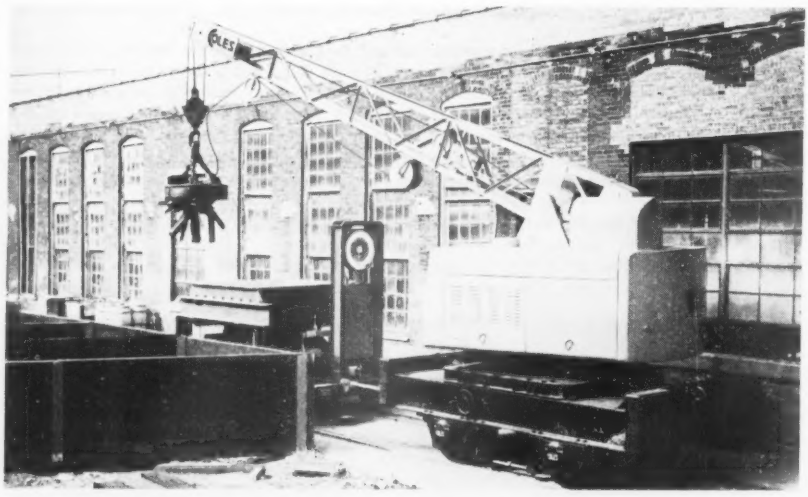
Frenco Products Inc., producer of impregnating material for castings and weldments, has acquired a new and larger plant at 507 E. 10 Mile Rd., Hazel Park, Mich.

Behr-Manning Division is building an office and warehouse at 4104 West 150th St., Cleveland 11, to cost $200,000. Company is a division of Norton Co., Worcester, Mass.

Black Products Co., Chicago, producer of foundry facing materials, has opened a West coast plant and sales office at Fontana, Calif., with Jack Folsom as manager.

Eclipse Fuel Engineering Co., Rockford, Ill., has appointed E. L. Mountcastle, 2617 Selwyn Ave., Charlotte 7, N. C. to be its representative in North and South Carolina.

Missouri Diecasting Co., 1411 North Seventeenth St., St. Louis 6, suffered damage estimated at $80,000 June 21 when fire of undetermined origin swept the plant.



SPEED CUPOLA CHARGE MAKE-UP: Three elements comprise the cupola charge make-up system recently installed at Dodge Mfg. Co., Mishawaka, Ind.—a Coles rail-mounted crane, a Whiting batch weigh car and heated tracks, which prevent snow accumulation in the winter. The crane picks up scrap and pig iron from bins outside the foundry and drops it into the weigh car for transfer to the cupola. The crane can lift 7 tons at a 10-ft radius, and electric power is provided by an engine-driven generator

Close to 3 yds. of ammonium sulphite handled by this 2¼-yd. MICHIGAN . . .

The bonus in the bucket pays for this machine fast!

Take another look at the bucket in the photograph. It shows a typical MICHIGAN* bucket-load, heaped-up well over the rated capacity of the bucket—nearly a 50% bonus. Translate this bonus into your daily production and you'll see why a MICHIGAN Tractor Shovel pays for itself fast: you simply move more material with a MICHIGAN.

Tremendous digging ability. Get the bucket blade into hard-to-dig material or under a heavy obstacle and "work" the bucket until you've got a heaping load. The two double acting bucket cylinders are actually powerful enough (if the blade is under an immovable object) to pull the back wheels off the ground! We'll match the MICHIGAN'S digging ability against any make or type of Tractor Shovel, bar none.

Low-level bucket action. You can roll the bucket back only a few inches off the ground—heaping bucket-loads even when the material is scattered only a few inches high. And you can carry the full load *low*—your driver can *see* where he's going, he doesn't have to travel *backwards*.

No clutch—faster cycles. There's no clutch pedal on a MICHIGAN. You can actually shift between Forward and Reverse *while moving:* simply push the hand-lever on the steering column—MICHIGAN'S power-shift transmission shifts instantly. Power-shifting saves time and energy every cycle. Your operators will say: "This sure beats riding a heavy-duty clutch all day!"

See it in action—on your own job. Write us and we'll arrange a demonstration. MICHIGANS are built to handle jobs too tough for other rubber-tired Tractor Shovels—*let us prove it,* without obligation. Write for details on the pay-as-you-go MICHIGAN Lease Plan—you can put these machines to work without laying out a penny of capital.

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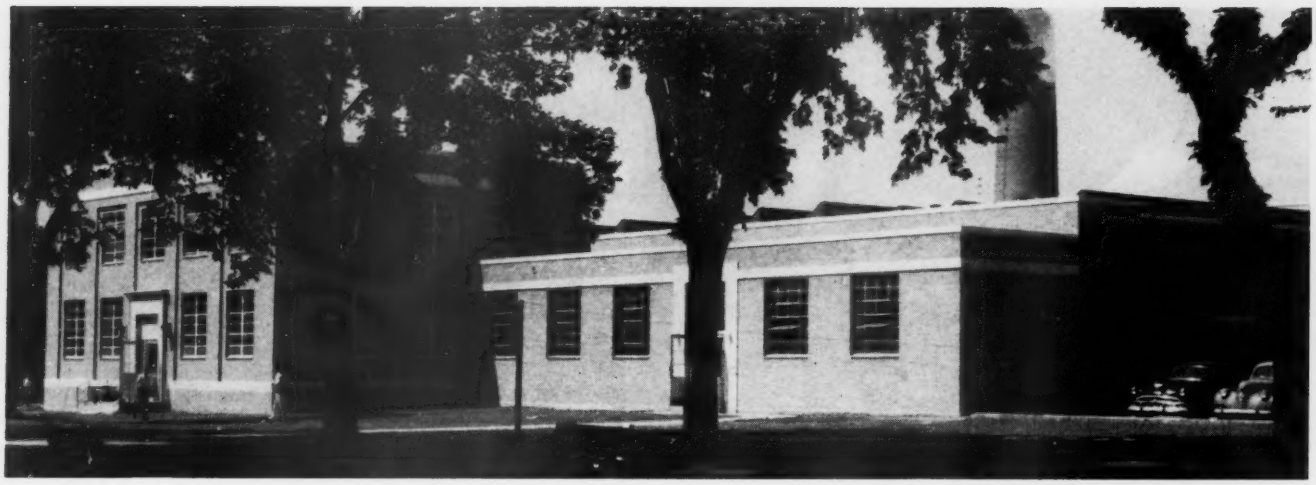

This building at Missouri School of Mines will be the headquarters for the conference

MISSOURI VALLEY CONFERENCE

Is Planned for September

WEBB L. KAMMERER
General Chairman

CURTIS L. WILSON
Honorary Chairman

A Missouri Valley Regional Foundry Conference will be held this year on Thursday and Friday, Sept. 29-30, for the first time since the beginning of World War II. Site of the meeting will be the campus of Missouri School of Mines & Metallurgy, Rolla, Mo. Sponsors are St. Louis, Mo-Kan (Kansas City) and Tri-State (Tulsa) Chapters and the MSM&M Student Chapter of the AFS.

General chairman is Webb L. Kammerer, president, Midvale Mining & Mfg. Co., St. Louis, and 1953-54 chairman of St. Louis Chapter. Honorary chairman is Curtis L. Wilson, dean, MSM&M, who is well known as both a metallurgist and an educator.

The general conference committee is made up of the chairmen and vice chairmen of the sponsoring chapters and of both present and past national AFS directors in the area. It includes faculty members Dr. A. W. Schlechten and Dr. D. S. Eppelsheimer and student Erhard Neuman from MSM&M; Lloyd Canfield and Henry C. Deterding from Mo-Kan Chapter; Donald W. McArthur and Willis H. Mook from Tri-State Chapter; and J. T. Westwood Jr. (national AFS director), Fred J. Boeneker, C. R. Culling, A. L. Hunt and George L. Mitsch from St. Louis Chapter.

An Ozark Hillbilly Jamboree has been planned for Thursday evening at the Forest Springs Lodge and will include a barbecue. Ladies are welcome at Rolla, with no registration fee, and a program of entertainment will be offered for them. Adequate housing has been provided and will be allocated through a central housing bureau to be established in the near future.

Foundrymen interested in further details and advance registration applications should write to Missouri Valley Regional Conference, care of Midvale Mining & Mfg. Co., 5015 Manchester Ave., St. Louis 10.

Details of the program follow:

Thursday, Sept. 29

9:00 a.m.—Registration

10:15 a.m.—Conference Opening: Webb L. Kammerer, Midvale Mining & Mfg. Co., St. Louis, conference chairman.

10:30 a.m.—Joint Session: "New Horizons in Foundry Progress," Hans J. Heine, technical director, AFS, Chicago.

2:00 p.m.—Joint Session: "Can Shell Cores Help You?" W. J. White, sales manager, Shallway Corp., Connellsville, Pa.

3:30 p.m.—Sectional Meeting: *Gray Iron*, "Practical Approach to Quality Control in the Gray Iron Foundry," Charles F. Walton, technical director, Gray Iron Founders' Society, Cleveland. *Steel*, "Steel Casting Design," William T. Bean Jr., Detroit. *Nonferrous*, "Practical Gating and Risering of Nonferrous Castings," R. A. Colton, research metallurgist, Federated Metals Division, American Smelting & Refining Co., Newark, N. J.

5:30 p.m.—Ozark Hillbilly Jamboree

Friday, Sept. 30

9:30 a.m.—Joint Session: "Practical Modernization for Small Foundries," C. V. Nass, general manager, Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago.

10:30 a.m.—Sectional Meetings: *Gray Iron*, "Proper Heat Treatment of Gray Iron Castings To Develop Maximum Properties," Dr. C. R. Austin, assistant to president, Meehanite Metal Corp., New Rochelle, N. Y. *Steel*, "Steel Castings vs. Forgings," J. B. Caine, foundry consultant, Cincinnati. *Nonferrous*, "Economics of Quality Control in the Bronze Foundry," Harry C. Ahl Jr., project engineer, National Bearing Division, American Brake Shoe Co., Meadville, Pa.

12:15 p.m.—Luncheon

2:00 p.m.—Conference Adjournment

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By VINCENT DELPORT
European Manager

The mayor of Westminster, Councillor Patrick Stirling, presented the E. J. Fox Medal to L. B. Pfeil

I B F Is Host to International Foundry Congress

TRADITION lent additional dignity and interest to the proceedings of the 22nd International Foundry Congress. The meeting was held in London, June 19-25, under the auspices of the International Committee of Foundry Technical Associations, and was organized by the Institute of British Foundrymen, the host.

The formal opening on June 21 at the Dorchester Hotel was performed by the Mayor of Westminster, Councillor Patrick Stirling, with Dr. A. B. Everest, president of the institute, in the chair. Accompanying them on the platform were Y. R. W. Granstrom, of Sweden, president of the International Committee; Max Vuilleumier, of Switzerland, vice president; John Bell, immediate past president of the institute; H. J. V. Williams, senior vice president; John Blakiston, junior vice president; and George Lambert, secretary of the institute and honorary secretary of the International Committee.

Opening the meeting, President Everest welcomed the mayor of Westminster. He noted that about 1000 persons, of whom some 400 came from foreign countries, had registered for the congress, and that there also were over 200 guests and officials. This attendance is believed to be a record in Europe. The International Committee includes in its membership the foundry technical organizations of 15 nations, including Finland and Japan, which joined recently.

On behalf of all foreign delegates, the president of the International Committee, Mr. Granstrom, thanked Dr. Everest for his welcome and hospitality. He stressed the value of international meetings in furthering the progress of the foundry industry and stimulating mutual understanding between foundrymen of many nations. He also emphasized the importance of human relationship in the foundry, between management and employees.

The mayor of Westminster, welcoming the visitors and declaring the congress open, referred to the city of Westminster as a center of the British Commonwealth. Westminster is one of the two cities of Greater London, which, in addition, is comprised of 27 boroughs and a number of outlying districts, all of which form the County of London, under the jurisdiction of the London County Council.

President Everest read telegrams of greetings from A. Brizon, immediate past president of the International Committee, who was unable to attend because of a recent illness; from the Australian branch of the institute; from Japan and India, and from J. Leonard, of Belgium, a past president of the International Committee. Dr. Everest then invited John Bell, immediate past president of the IBF, to take the chair for the announcement of the following IBF awards for 1954:

E. J. Fox Medal—To Dr. L. B. Pfeil, Fellow of the Royal Society, in recognition of his outstanding services to the foundry industry and

DR. A. B. EVEREST
President

H. J. V. WILLIAMS
Senior Vice President

JOHN BLAKISTON
Junior Vice President

Dr. A. B. Everest, president of the IBF, addressed the audience at the opening session of the congress

President Granstrom, International Committee, presented the International Award to V. C. Faulkner

metallurgy and in particular for his work on high-temperature alloys.

Oliver Stubbs Medal—To E. S. Renshaw in recognition of his outstanding contributions in the field of cupola practice and the readiness with which he has imparted his knowledge to fellow members of the institute and to associated bodies abroad.

British Foundry Medal and Prize—To John M. Langham, for his paper "The Founding of Marine Propellers," published in Vol. XLVII, *Proceedings,* IBF.

Meritorious Services Medal—To John G. Bailes in recognition of his outstanding work on behalf of the institute and the Sheffield branch and in particular for the exacting duties he has carried out so efficiently as chairman of the membership committee.

The first award of the John Bell Traveling Scholarship was made to D. W. Clinton, a student at the Royal Technical College, Glasgow. After a short interval, Dr. Everest delivered his presidential address.

Subject of the presidential address was international technical co-operation and the part played by the International Committee of Foundry Technical Associations in the progress of the foundry industry everywhere.

Referring to the spectacular and rapid growth of knowledge in metallurgy in recent years, the president mentioned that foundry practice was passing more and more from an art to a science. This shift he attributed in no small measure to co-operation between the foundryman and the metallurgist and particularly to the free exchange of information on developments between nations.

At the turn of the present century, foundrymen were forming associations among themselves for the discussion of their problems and the exchange of ideas. The American Foundrymen's Association, later renamed the American Foundrymen's Society, was formed in 1896. A few years later, in 1904, the Institute of British Foundrymen was constituted under the name of the British Foundrymen's Association, and about the same time, French and other foundrymen were forming similar groups.

The idea of exchange papers at foundrymen's meetings was instituted in 1921 and soon became well established both at national and international conferences. In all, some hundreds of such exchange papers have now been presented.

From this beginning, the first official International Foundry Congress was organized in Paris in 1923. At first, progress seemed to be almost too rapid. Many associations endeavored to elevate their national conferences to the status of international meetings.

Accordingly, at the suggestion of the late Paul Ropsy of Belgium, a meeting of foundry assocation presidents was held in Brussels in December, 1926, to study this problem. The outcome of that meeting was the formation of the International Committee of Foundry Technical Associations. Its first task was to coordinate and regulate plans for the organization of international foundry congresses. The late Tom Makemson was appointed honorary secretary, a post he held to the time of his death last year.

The first full meeting of the committee was held in Paris in 1927, with Mr. Ropsy in the chair. In organizing the program of international gatherings, the committee also drew up rules for the control of exchange papers, gave guidance on the timing of exhibitions directly associated with the foundry industry and made plans for the exchange of official journals and technical information. In addition, the committee is able officially to represent the industry at an international level to cooperate with related movements. Under the International Committee since 1927, conferences have been organized throughout the years between the two World Wars, and in the period since 1948.

The International Committee does exacting work, but it has no power over the conduct of the constituent associations. Three technical subcommittees work for it dealing respectively with the international foundry dictionary, testing cast iron, and foundry defects.

A fundamental problem in the international exchange of information is the language difficulty. As early as 1927, Professor Pisek asked for the help of the committee in this connection, and a plan for the collection and translation of foundry terms into leading languages was begun. In 1949, in Amsterdam, proposals were accepted from Com. Olivo of Italy for the formation of a new committee to prepare a more nearly complete international dictionary of foundry terms. Good progress has been made, based on lists of words and definitions prepared by a French committee under the leadership of Dr. M. Ballay, of France. Translations of the lists have been made into several other languages, and the work continues.

At the international congress in Philadelphia in 1934, J. Leonard of Belgium proposed the formation of a Committee on Testing Cast Iron, and by 1938 this committee was in

active being. A great deal of work has been carried out, by such prominent foundrymen as Leonard, Jungbluth, Foulon, Collaud and Lissell, in reviewing existing specifications in different countries, with the aim of sorting them out to see what basis there might be for co-ordination. It now appears that there is a definite possibility of standardizing on the dimensions of at least one test bar for the tensile test on cast iron.

The establishment of an international test bar, at least on a research level, as has been suggested in the committee, would be a definite start although healthy disagreement exists as to the best method of casting a bar. A further proposal which has been favorably considered is the grading of cast iron according to tensile strength, based on intervals of 5 kg per square mm.

The Technical Committee on Testing Cast Iron has no definite power to implement its decisions, but a new factor has now arisen in the formation, under the International Organization for Standardization, of Committee ISO/TC.25, on cast iron. The possibility of international standardization was visualized in the early days of the International Association for Testing Materials. No positive action toward standardization was taken by that body, but was relegated to the International Standards Association, which was operative before the last war.

The work of this last body was taken up after the war by the United Nations standards co-ordinating committee, now superseded by the International Organization for Standardization, with headquarters in Switzerland. Under I.O.S., attention has been given to the products of the foundry industry, and, in fact, an international standard is now in force for cast iron pipe. It need hardly be emphasized that this type of activity is of great assistance to international trade, as well as to the exchange of technical information.

By agreement of the International Committee of Foundry Technical Associations, the work of their testing committee has been made available to the British Standards Institution in preparing the program for ISO/TC.25, and considerable time and effort will be spared the new committee by the work already done.

Considered Foundry Defects

Another technical matter which engaged the attention of the main International Committee in its early days was the question of foundry defects. At the suggestion of Professor Portevin, a committee was formed in 1937, under the chairmanship of Professor Gierdziejewski, of Poland, to follow up on an international level the work already begun by A. Le Thomas at the Centre Technique des Industries de la Fonderie in Paris.

The committee was formed to classify defects on a basis which would help foundrymen to produce better castings, and a collection of photographs of casting defects, together with case histories, was made. This work was of such interest that two papers on it were presented at the International Foundry Congress, Paris, in 1937, when an attempt at classification of defects was put forward. Considerable international cooperation took place in the collection of examples and in the exchange of information, but further positive action was prevented by World War II, and in the meantime, various nations, including the U.S.A. and Great Britain, published atlases of defects of their own.

At the International Congress in Amsterdam, in 1949, the Committee

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on Defects was reformed. Guy Henon, of France, proposed a system of classification of defects which was presented in the form of a paper to the Amsterdam congress in 1949. The committee adopted the proposed classification, and it has been used in the preparation of the French edition of the *Atlas of Defects*, the first part of which, on cast iron, was published in France in 1952, by a committee led by Dr. Ballay. The second part, dealing with steel and nonferrous castings, is now ready. Through the International Committee on Foundry Defects, the data included in the first edition are made available to all constituent member countries if they wish to prepare their own editions of the atlas.

Another direction in which international co-operation is developing is in the acceptance of standard marking and coloring of patterns. Recommendations of the American Foundrymen's Society have formed the basis of useful agreement on the subject between foundrymen of the world.

Close Contact on Research

At the research level, there is already considerable co-operation, and international relations are good. The leading research organizations in Great Britain have close contact with their colleagues abroad, and the most friendly relationships possible exist between research associations and laboratories throughout Europe.

The morning's proceedings ended with the presentation of the Edward Williams Lecture by Dr. T. E. Allibone, Fellow of the Royal Society and director of the laboratory of Associated Electric Industries Ltd. During the war, Dr. Allibone was in charge of a group of British and American scientists at the University of California under Prof. E. O. Lawrence. The subject of his address was "Metals, Perfect and Imperfect." He dealt with the impact on metallurgy of the discoveries arising out of atomic science.

Starting from x-ray examination of the structure of metals and alloys, he showed that with the electron microscope and the spectrograph it now is possible to detect impurities and their effects on the arrangement of molecules. He explained how traces of impurities interfere with the arrangement of molecules in a crystal, thus causing disturbances responsible for fatigue, creep and other detrimental phenomena.

He said that we now know which elements cause certain metals to be brittle and explained how, by using certain methods of melting, like an arc cooled furnace in argon atmosphere, a brittle metal such as chromium can be rendered ductile. He also mentioned a recently developed experimental induction furnace with which impurities can be removed gradually.

Dr. Allibone showed a short length of a remarkable film, made by A. J. Forty in the United States, which showed how large paraffin molecules crystallize out of a petroleum solution in mono-molecular steps. In conclusion, he said that weapons now exist to reduce impurities to almost negligible amounts, and that there are grounds for hoping for still further elimination.

Throughout the week, except Thursday, technical papers were discussed at morning and afternoon sessions. These papers will be reviewed in a subsequent issue. All of Thursday, June 23, was devoted to works visits, covering all aspects of the foundry industry.

The annual meeting of the International Committee of Foundry Tech-

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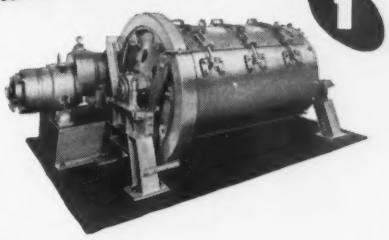

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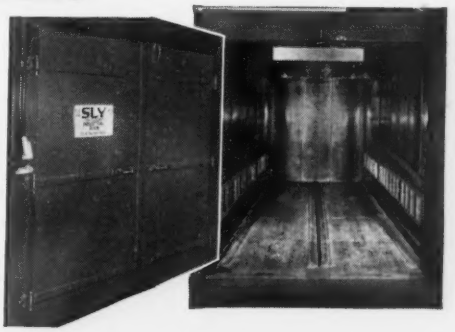

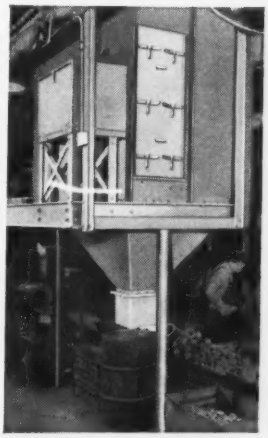

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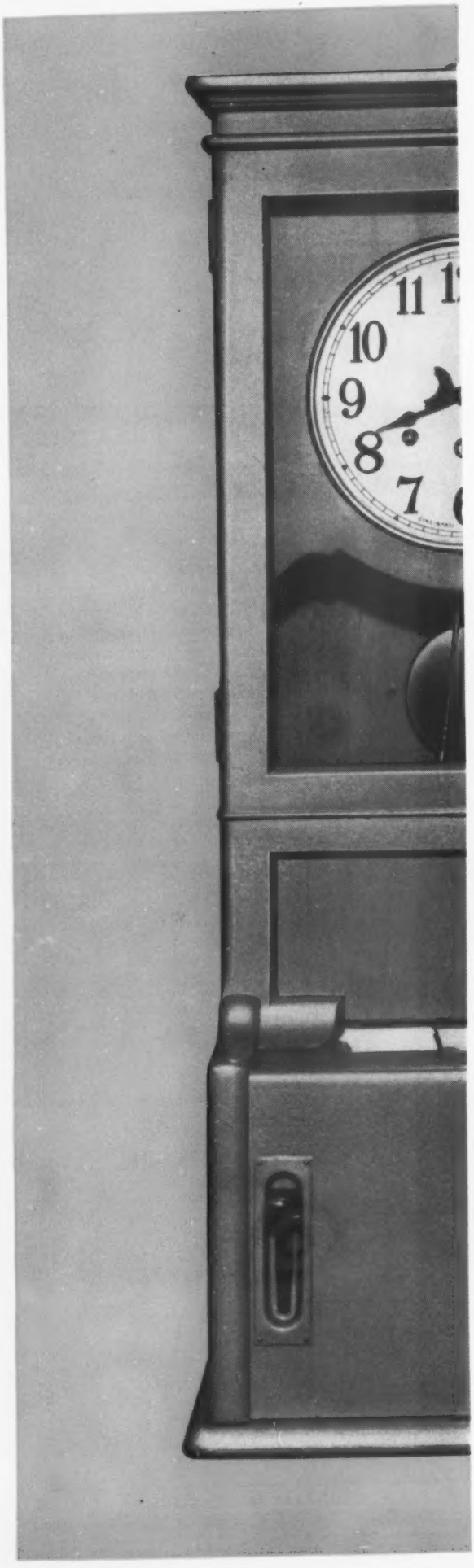

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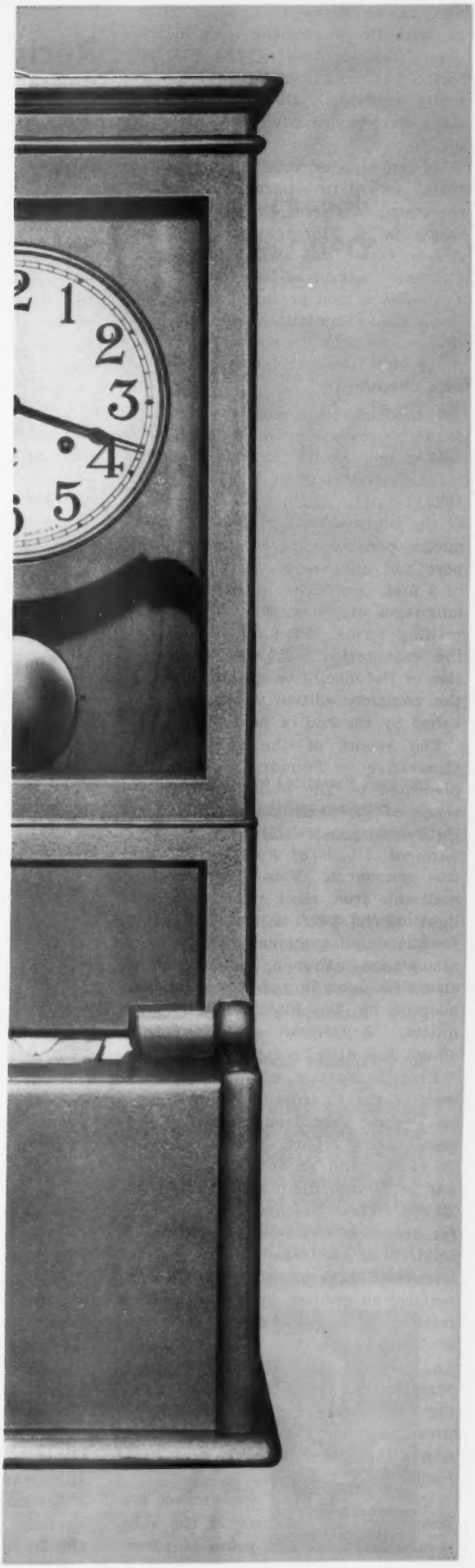

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nical Associations took place June 23, with President Granstrom in the chair. Membership of the Finnish and Japanese associations was formally confirmed, and both associations were represented at the meeting.

By unanimous vote, the International Award (a replica in bronze of the statue of Perseus, the original of which is in Florence), founded by Comm. Olivo, was awarded to V. C. Faulkner, editor of *Foundry Trade Journal* and past president of the International Committee, in recognition of his outstanding contributions to international relations in the foundry industry.

The committee invited the German foundry association, which will be the host at next year's congress, to nominate the recipient of the award for 1956. Comm. Mario Olivo, chairman of the International Dictionary Committee, presented the committee's report and announced the publication of a first, provisional edition in eight languages of the dictionary covering melting terms. Plans were made in the expectation, with the co-operation of the member associations, that the complete edition would be published by the end of next year.

The report of the International Committee on Foundry Defects was presented by Dr. Ballay in the absence of its chairman, Guy Henon. Publication of Vol. II of the *International Album of Foundry Defects* was announced. This volume covers malleable iron, steel, nonferrous and light alloys. Vol. I, published last year, covered gray cast iron. These albums are in French, and defects are classified according to the scheme adopted by the International Committee. A German edition of this album has also been published.

Prof. P. Bastien, of France, chairman of the International Committee on Testing Cast Iron, presented the committee's report. It had agreed to recommend an international test bar of 30-mm diam rough cast and 20-mm when machined, exclusively for research and reference purposes relative to the tensile test of gray iron only. Agreement also had been reached on grading gray cast iron in relation to tensile strength, in steps of 5 kg per sq mm, from 15 to 40 kg. Liaison with the International Standards Organization, I.S.O., is being maintained, and a report will be presented to I.S.O./T.C.25 on cast iron at the I.S.O. meeting next September.

Professor Bastien announced his resignation as chairman of the subcommittee, after five years of office. Prof. Dr. Ing. H. Jungbluth, of Germany was elected unanimously.

The calendar of international congresses for the next three years was fixed as follows: 1956, Germany, at Dusseldorf; 1957, Sweden, at Stockholm; and 1958, Belgium, at Brussels.

The committee elected its officers for 1956 as follows: *President*: Max Vuilleumier, of Switzerland; *vice president*: The IBF was invited to nominate one of its members as vice president; *honorary secretary*: George Lambert, secretary of the IBF, was re-elected unanimously.

On the day preceding the formal opening of the congress, June 20, the Institute of British Foundrymen held its annual general meeting. It was reported that membership as of April 16, 1955, totaled 5469, compared with 5295 on Apr. 20, 1954. At this meeting the election of officers for 1955-56 took place with the following results: *President*: Dr. A. B. Everest, Mond Nickel Co. Ltd., London; *senior vice president*: H. J. V. Williams, joint managing director, John Williams & Sons (Cardiff) Ltd.; and *junior vice president*: John Blakiston, foundry consultant, Halifax.

The closing ceremony of the congress was held June 24 and was performed by Sir Harold Webbe, member of Parliament for Westminster. President Everest read a telegram

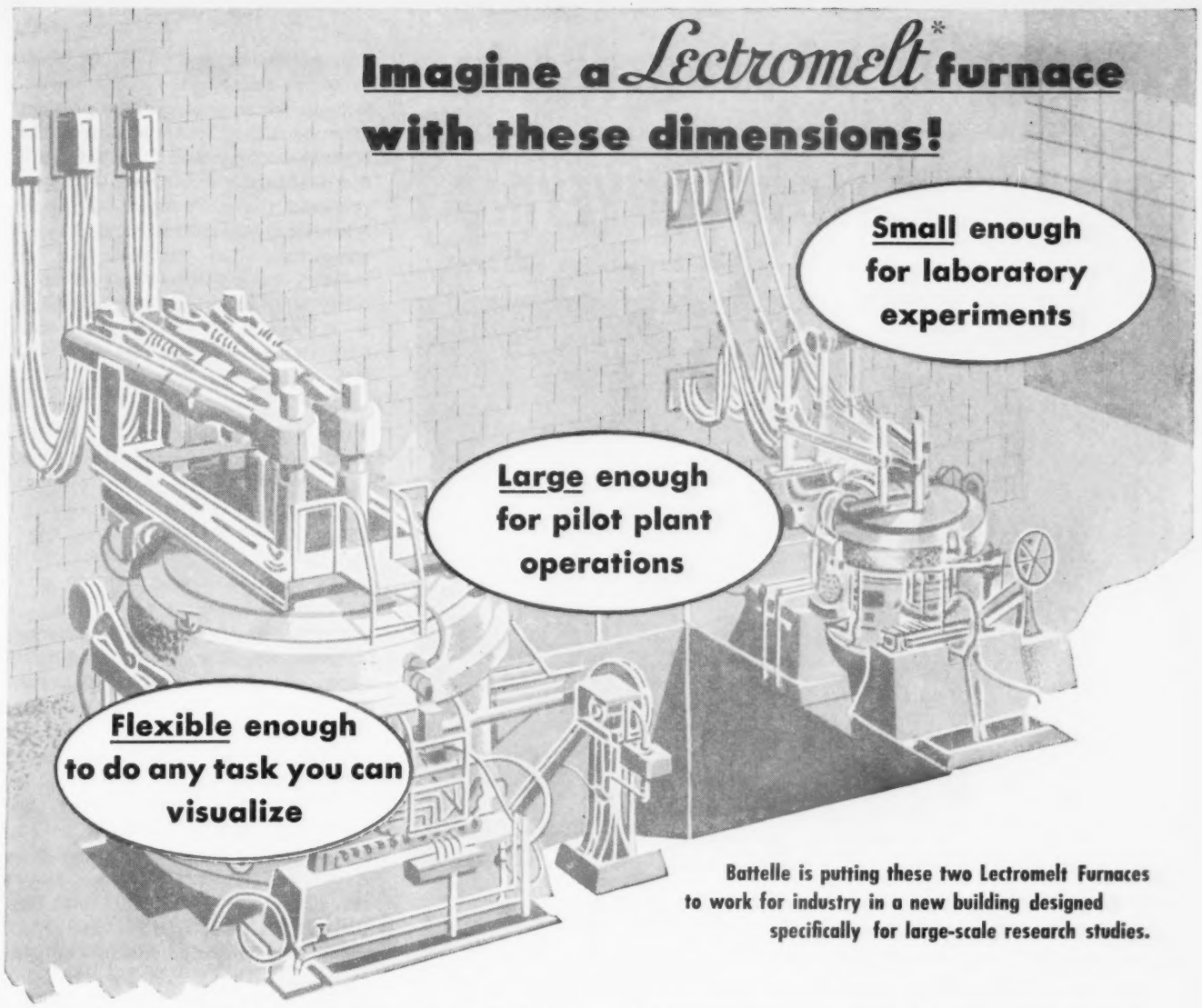
Recipients of IBF Awards

L. B. PFEIL, who was awarded the E. J. Fox Medal, was lecturer in metallurgy at University College, Swansea, until 1930 when he joined Mond Nickel Co. where he is now a director. For 15 years he was in charge of its research laboratories, in Birmingham, and since 1945 has been manager of the company's development and research department. Dr. Pfeil has served on the council and research committees of the British Cast Iron Research Association, British Non-Ferrous Metals Research Association and the British Iron and Steel Research Association.

JOHN M. LANGHAM, winner of the British Foundry Medal and Prize, was educated at Queen's College, Cambridge. In 1947 he joined J. Stone & Co., and in 1951 became marine production manager at the Charlton Works. At the International Congress at Florence last year Mr. Langham delivered the official exchange paper of the IBF on the subject of the founding of marine propellers.

E. S. RENSHAW, recipient of the Oliver Stubbs Medal, received his metallurgical training at Sheffield University. In 1929 he joined Henry Ford & Son Ltd., Cork, Eire, as metallurgist, and since 1932 has been foundry technical superintendent at Ford Motor Co., Dagenham. He has visited the United States on a number of occasions and in 1951 he presented the official exchange paper of the IBF to the American Foundrymen's Society. Mr. Renshaw received the British Foundry Medal of the institute in 1951, and has served as a member of a number of technical subcommittees since joining the IBF in 1934.

JOHN G. BAILES, who received the Meritorious Services Medal, for 13 years has been foundry manager, William Jessop & Sons Ltd., Sheffield. Previously for 18 years he was associated with Head, Wrightson & Co., Thornaby-on-Tees. Mr. Bailes has served on the council of the IBF for many years and on a number of administrative and technical subcommittees. He was president of the Sheffield branch in 1949-50. He is a licensee of the Institution of Metallurgists and is a member of the American Foundrymen's Society.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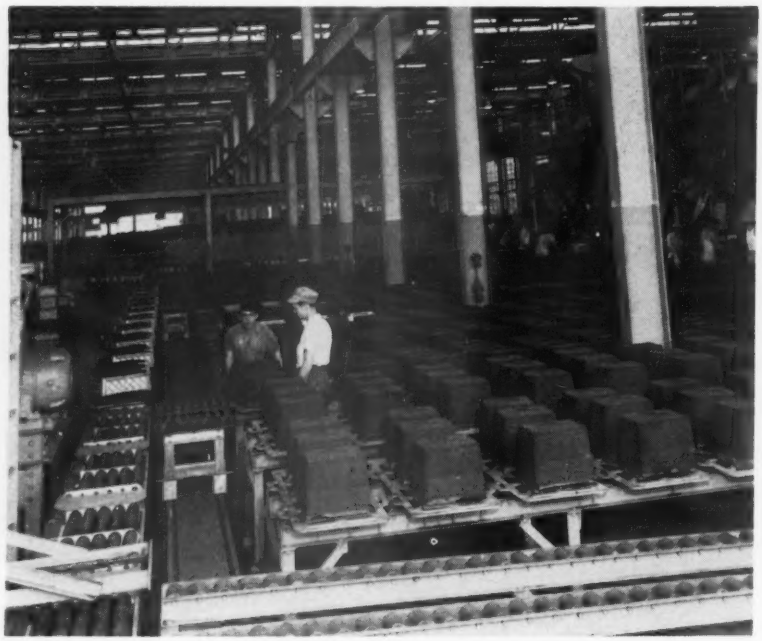

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received from Her Majesty the Queen, in reply to the message addressed to her and to H. R. H. the Duke of Edinburgh on the opening day, on which occasion the president announced that Prince Philip had accepted an honorary membership in the institute. President Granstrom reviewed the work done by the International Committee and its subcommittees, and thanked the IBF through its president for its hospitality and successful arrangements. V. C. Faulkner then was presented with the International Award.

In his closing address, Sir Harold Webbe referred to the spectacular improvements achieved by industry in the few past years. He forecast a coming rapid rise in the standard of living, but warned that such advance in the material sphere raised spiritual and social problems which every individual must help to solve.

Principal guest at the banquet on June 24 was the Lord High Chancellor, the Rt. Hon. Viscount Kilmuir (speaker of the House of Lords). He was supported by the Lord Mayor of London and by the Mayor of Westminster. About 800 visitors and guests attended.

An extensive social program had been organized, including a government reception by the Minister of Supply at Lancaster House and a reception by President and Mrs. Everest at the Hall of the Fishmongers' Company, one of the outstanding livery companies or city guilds, dating back to the Middle Ages. On June 19, prior to the opening of the congress, a get-together garden party was held at the residence of H. Barrington Hooper, managing director of Industrial Newspapers, Ltd. On June 25 an excursion was arranged for all members to Blenheim Palace, the seat of the Duke of Malborough, where Sir Winston Churchill was born, and to Oxford, where the university colleges were visited. Other attractions were made available during the week, including a specially arranged program for lady visitors.

During the week following the congress in London, two post-congress tours were arranged by branches of the Institute of British Foundrymen. One took the visitors to the Midlands, covering Birmingham, Derby, Darlaston and Manchester. The other tour covered Glasgow, Newcastle-on-Tyne and Sheffield. In each instance, the branches made themselves responsible for organizing visits to foundries and other works and for some social activities as well.

Steel Founders' Society Names 1955 Poster Contest Winners

Steel Founders' Society of America has announced the winners of its 1955 annual safety poster contest. They are Erwin Kirsch, foreman of standards and time study, Falk Corp., Milwaukee; Nick Pugliese, roll molder, Union Steel Casting Division, Blaw-Knox Co., Pittsburgh; Vernon E. Lich, Commonwealth Plant, General Steel Castings Corp., Granite City, Ill.; and Miss Marion Grover, assistant to the metallurgist, Atlantic Steel Castings Co., Chester, Pa.

Posters can be submitted by any employee of a foundry which belongs to the society. Three winners are chosen in each of the eight geographical divisions of the society. From these winners, the top four are chosen for exhibition immediately before and during the society's annual safety contest in June, July and August. Eight additional posters submitted for final judging are reproduced and distributed to member plants for use during the other eight months of the year.

Manual Covers Handling of Aluminum Alloy

A manual on the handling of Al-10 per cent Mg alloy has been prepared for Army Ordnance by Battelle Memorial Institute, Columbus, O., and published by the Office of Technical Services, U. S. Department of Commerce. The volume suggests how to overcome problems of oxidation, gas porosity and shrinkage. Sections cover melting, gating and risering, hot and cold cracking and properties of sand. Order PB 111577 from OTS, U. S. Department of Commerce, Washington 2, D. C. Price is $3.25.

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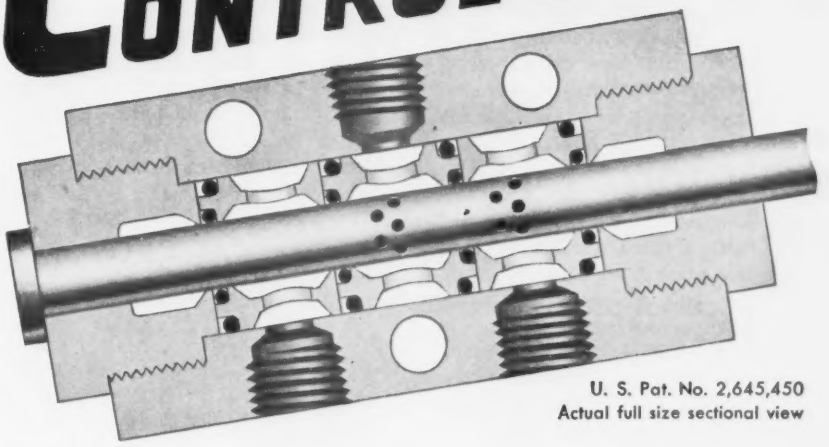

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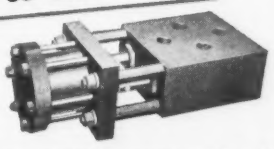

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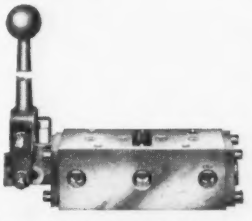

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Foundry Developments

By EDWIN BREMER
Metallurgical Editor

WORK on "Factors Influencing the Chilling of Cast Iron" by W. J. Williams and described in the June issue of *Metallurgia* (Manchester, England), points out that superheating increases depth of chill. The effect becomes more pronounced as the temperature exceeds 2550° F. Inoculation with ferrosilicon does not eliminate the effect of superheating, but does remove a fixed amount of chill in cold-melted and superheated iron. Inoculation with graphite eliminates effect of superheating, resulting in the same depth of chill in cold-melted and superheated metals.

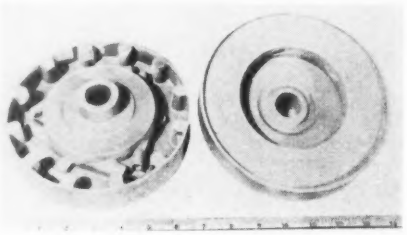
Graphitizing effect associated with cold-melted iron does not return by holding the metal at a low temperature after it has been superheated. Original graphitizing potential only can be regenerated either by inoculation with graphite or casting the metal to give a gray-base material and then remelting. A gray-base material gives less chill at all stages of melting than a white-base material produced from the same original melt, and thus having the same history and composition.

Withstands the Heat

INTERESTING development which might have possible application in production of castings is that of coating metals with highly refractory oxide materials by means of the oxy-acetylene flame. The process recently was announced by Norton Co., Worcester, Mass. Primarily designed for application to metal parts in rockets, jet engines, etc., the operation provides thin coats of pure aluminum oxide, zirconium oxide, etc., on the metals. This results in a longer life under high-temperature conditions and erosive flame action. Same method is employed to place a thin coat of silicon carbide on graphite which increases its surface hardness and resistance to oxidation.

Tricky Job

ACCOMPANYING illustration shows an aluminum aircraft fuel pump casting produced by Mercast Corp., New York, using the investment molding process with frozen mercury as the expendable pattern material. While appearing to be a simple casting, the requirement of six curved venturi-type metering jets accurately positioned around the central housing and with extremely smooth interior passages, made it otherwise. Location and form of the



jets precluded use of metal cores or machining, but investment molding supplied the necessary accuracy and smoothness of surface.

Requires Careful Work

IN A paper, "Reproducibility of Charpy Impact Test," by David E. Driscoll, Watertown Arsenal, Watertown, Mass., presented at the recent ASTM meeting, it was stated that while many published reports show a wide scatter in energy values and in many cases a variation in energy where two or more machines are used, it has been proved in general that the wide scatter is due to poor steel quality, poor heat treatment or both. Variations in machines are caused by poor testing techniques, poor conditions of the machine or both. As a result, the Watertown Arsenal Laboratory and many facilities concur that when properly conducted, the Charpy test is truly an accurate, reproducible test.

Has Favorable Effect

STUDY of the influence of boron on a cast cobalt-base alloy by Blatz, Reynolds and Dyrkacz, and reported at the recent meeting of American Society for Testing Materials, indicates a favorable effect. Alloy used as the base contained 0.40 per cent C, 1.2 per cent Mn, 0.40 per cent Si, 20 per cent each of Cr and Ni, 4 per cent each of Mo, W, and Cb plus Ta, 2 per cent Fe, and remainder Co. Some of the authors' conclusions are that B additions to the cast alloy markedly improve rupture strength up to an optimum at about 1 per cent B, above which rupture strength gradually decreases. Optimum alloy has rupture strengths at about 1650° F equivalent to those of wrought base alloy at 1500° F. These alloys have good rupture ductility as well. Boron modifications of the alloy have excellent castability. Casting characteristics with very good B recoveries during melting indicate that quality control on a production basis is readily feasible.

Simple, but Effective

MANY small gray iron foundries would benefit considerably by using a wedge bar to correlate metal and castings. Takes a little time to develop relationships, but is simple to perform and well worthwhile.

Results Are Shocking

NEW instrument for measuring the effect of impact on metals and plastics has been developed in the Research Division, College of Engineering, New York University. Called the "impact tube" the instrument indicates impact in terms of dynamic stress-strain relationships. It essentially is a steel tube 18 in. in diam and 14 ft long which is divided into three parts called the static chamber, dynamic chamber and firing chamber. Test specimen in the form of a circular plate is mounted between the static and dynamic chambers. End of the dynamic chamber is sealed with a plastic diaphragm supported by a pneumatically controlled piston in the firing chamber. Equal pressures are built up in the three chambers. Then that in the firing chamber is released quickly, permitting the seal on the dynamic chamber to rupture. Pressure in the static chamber then sends a shock wave against the specimen diaphragm. Impact effect is indicated on pressure gages and transducers attached to an oscilloscope.

BASIC NEWS
FOR CUPOLA OPERATORS

Basic Refractories offers field service to foundries

Cupola operators interested in adopting a basic practice can get refractory information and assistance from Basic Refractories' engineers. These men know refractory application and are familiar with cupola practice.

CONVERTING FROM ACID TO BASIC CUPOLA OPERATION INVOLVES CHANGING ONLY LINING IN MELT ZONE AND WELL

Replacing the acid lining in these two areas involves a comparatively simple changeover. And maintenance is easy after the basic lining has been installed.

Usual procedure is to place an insulating material or a course of fireclay brick next to the cupola shell. Then one or two courses of basic brick are installed to complete the permanent lining.

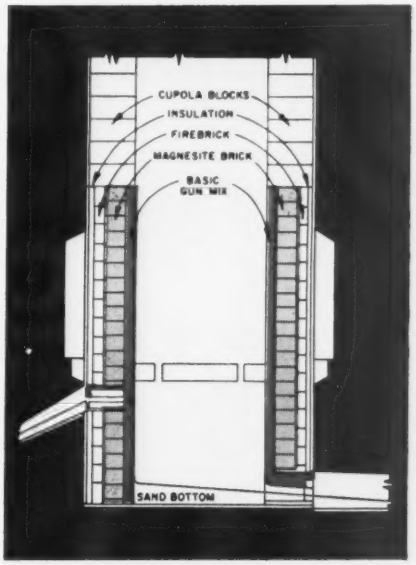
The height of the melt zone area determines the height to which the basic brick should extend above the tuyere level. This varies in each cupola. Usually a basic lining 60 inches above the tuyere level is adequate. Insulation next to the shell is desirable to avert excessive heat loss, since the thermal conductivity of magnesite brick is much greater than that of fireclay brick.

When brickwork has been completed, a fire is built in the cupola to completely remove moisture. After the bottom is dropped, brickwork should be covered with 2 or 3 inches of GUNDOL. This forms the working surface of the basic lining. It should be emplaced by a refractory gun specifically designed for this purpose.

Sand can be used to form the bottom of a basic-lined cupola and is usually better than basic materials, since it will not "hang up" when the bottom is dropped.

The slag hole of a rear slagging basic cupola is subject to severe chemical and mechanical erosion. GUNDOL can be used to install the slag hole quickly and easily. It is installed by either shooting or ramming the refractory around a pipe or rod the diameter of the desired hole.

With proper operation of the cupola, the tap hole of a rear-slagging basic lined cupola is almost trouble-free. Forming the tap hole with GUNDOL is convenient and saves time, since both it and the slag hole can be installed while the lining is being repaired with the gun.



Maintaining Basic lining is easy

Replacing brick work is seldom necessary if the cupola is properly maintained. And with the BRI Gun and GUNDOL, maintenance is easy and less time consuming.

GUNDOL, a basic gun refractory made by Basic Refractories, Inc., is a carefully controlled mixture of specially prepared dead burned dolomite and hydration resistant dead burned magnesite. To this, small amounts of chemicals are added as bonding agents.

8 advantages of Basic cupola operation

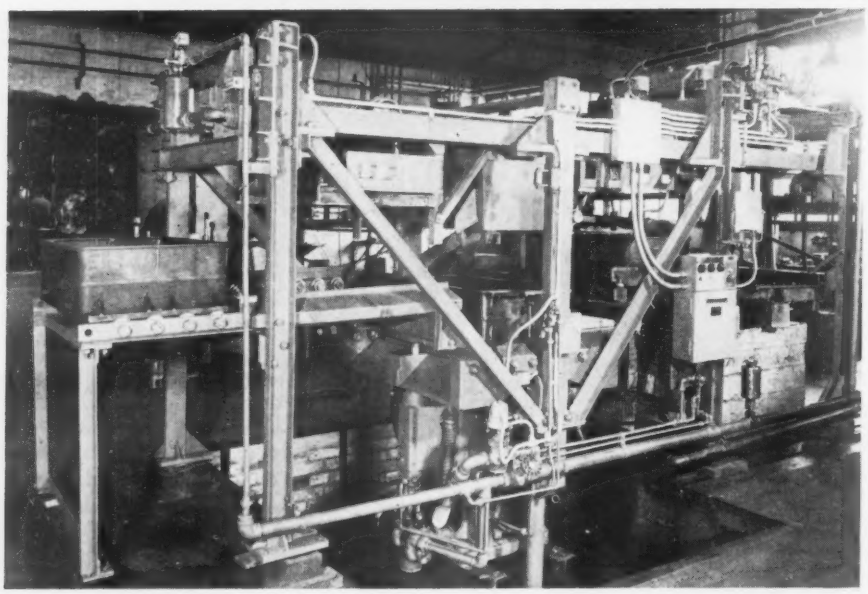
Basic lining and repair materials initially cost more than acid. But these costs are offset by the following advantages:

1. **Lower sulphur content in the iron produced**
2. **Greater carbon pickup**
3. **Steel scrap can be substituted for high-cost low-phosphorous pig iron without lowering the total carbon content of the iron produced**
4. **Lower cost metal charges can be used**
5. **Less scrap castings**
6. **Better pouring characteristics of metal**
7. **Absence of bridging and clean drop**
8. **Higher metal tap temperatures**

BASIC REFRACTORIES INCORPORATED
845 HANNA BUILDING • CLEVELAND 15, OHIO

REFRACTORIES ENGINEERING AND SUPPLIES LTD — EXCLUSIVE CANADIAN AGENTS

New Equipment and Supplies



Automatic Molding Unit: Coleman-Wallwork Co. Ltd., 32 Victoria St., London, S.W. 1, Eng.—Automatic molding unit requires no operators; all mold ramming operations are controlled by electronic timers which enable jolt, squeeze, simultaneous jolt-squeeze and vibration times to be accurately set for any particular mold being produced. Machine is designed for molds 34 x 20 and 10 in. deep each half at the rate of 240 per hour. Pattern plates reportedly can be changed quickly. Operational cycle is broken into five separate stations which operate simultaneously when machine is in operation.

For More Details Circle No. 1—Page 195

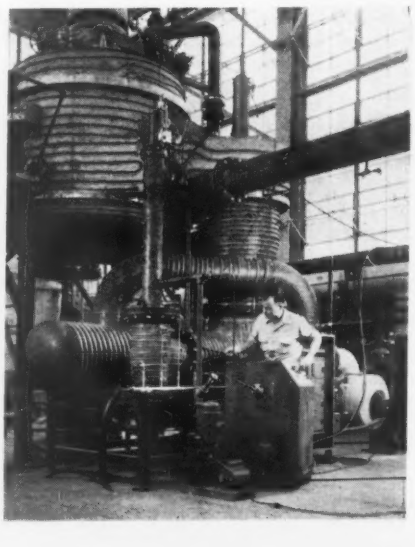
Induction Heating Unit: Lindberg Engineering Co., 2450 West Hubbard St., Chicago 12, Ill.—Single-station induction heating unit with variable transformer provides stepless variable control of continuous power output from 0 to 3 kw maximum and has applications for brazing, soldering, hardening, light heat treating or quick melting of small quantities of metal for spectroscopic analysis in research laboratories. A line of auxiliary work handling equipment is available.

For More Details Circle No. 2—Page 195

Air Turbine Grinder: R. G. Haskins Co., 2651 West Harrison St., Chicago 12, Ill.—Turbine-type air grinder weighs 18 oz, is 5¾ in. long and develops 1/5-hp at 75,000 rpm. Special features include permanently sealed bearings, removable nose piece, lightweight and hand-fitting aluminum housing. Gyro action of the turbine holds tool steady. Kit contains grinder, carrying case, adapter hose, mounted points, dressing stone and wrenches. Complete line of accessories also is available.

For More Details Circle No. 3—Page 195

Vacuum Pump: Consolidated Vacuum Corp., 1775 Mt. Read Blvd., Rochester 3, N. Y.—Large, three-stage oil ejector pump can remove 12½ lb of air per hr from a semi-continuous, vacuum melting and casting furnace. The unit is large enough to handle the gas load of a 1000-lb, high-vacuum melting and casting furnace. Its wide performance range, from ½ to 200 microns Hg pressure, permits diversified application in metallurgy.



For More Details Circle No. 4—Page 195

Graphite Brick: Mexico Refractories Co., Mexico, Mo.—Graphite brick which reportedly has given up to 31-days' service in a cupola well carrying 350 to 450 tons per day, are characterized by low porosity, negligible shrinkage and uniform structure. Brick are furnished unburned, to be laid up with a graphite base mortar. Brick can be used in cupola wells, hot metal spouts or ladle bottoms.

For More Details Circle No. 5—Page 195

Epoxy Compounds: Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City, N. J.—Two epoxy resin compounds for making pattern duplicates, fixtures and jigs for machining operations and dies for forming, drawing and trimming are

cured by chemical action. Reportedly they hold shrinkage to less than 0.3 per cent. Compounds are strongly fortified with aluminum to aid machineability and are said to flow readily into complicated molds and patterns for good reproduction. One compound cures at room temperature, the other requires heat curing. Both are unaffected by water and resist alkali and acid.

For More Details Circle No. 6—Page 195

Core Binder: B. F. Goodrich Chemical Co., 324 Rose Bldg., Cleveland 15—Synthetic resin core binder is claimed to have several advantages in areas of baking, gas formation, collapsibility and resistance to "over baking." No curing or chemical action occurs during baking of a core containing the binder. Manufacturer states that only a fraction of the

For More Details on These Items
Use Reply Card—Page 195

gas volume evolved from conventional core binding materials is produced. Use of cereal is not required. Other characteristics are excellent shakeout properties, dimensional and storage stability and non-irritating properties. Air drying of core prior to baking reportedly is not harmful. Material has been used successfully in casting aluminum, bronze, magnesium, malleable iron, gray iron, steel and stainless steel.

For More Details Circle No. 7—Page 195

Titanium Additive: E. I. duPont de Nemours & Co., Wilmington 98, Del.—Titanium metal for use as an additive in manufacture of ferrous and nonferrous alloys has a minimum titanium content of 97 per cent and a maximum content of 3 per cent Fe, 0.2 per cent N, 0.15 per cent C and 75 parts per million H. Material comes in two forms—pellets and fines. Pellets are shaped about like aspirin tablets. They are unsintered compacts of titanium particles and run about 100 lb per cu ft. They are used effectively as a ladle addition in production of 300 series stainless steel and in high-temperature resisting alloys, according to manufacturer. Fines are −14 mesh particles of spongy character and have uses in specialized processes.

For More Details Circle No. 8—Page 195

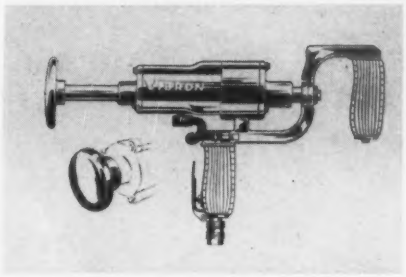
Heat Treating Furnaces: Ipsen Industries Inc., Rockford, Ill.—Heat treating furnaces feature multiple cooling zones for air cooling of work under protective atmospheres and make possible carburizing, carbontriding, normalizing, annealing, stress-relieving and brazing operations under complete atmosphere protection. Units are classified at 400, 500 and 900 lb per hr at 1500° F. Maximum weight per charge is 600, 800 and 1400 lb. Operating temperatures of 1850 or 2150°F are available.

For More Details Circle No. 9—Page 195

Grinding Wheel: Electro Refractories & Abrasives Corp., Buffalo, N. Y.—New vitrified bond for grinding wheels for gray iron is said to increase life span of the wheels up to 35 per cent longer without loss in cutting rate. The bond also gives the wheel added ability to hold a sharp corner on its grinding face, thus increasing its efficiency in snagging operations.

For More Details Circle No. 10—Page 195

Refractory Rammer: Burgess-Sterbenz Corp., Vibron Division, 3790 West 150th St., Cleveland 11, O.—



Lightweight, recoilless pneumatic refractory rammer is designed to reduce application time for all types of refractory ramming. Made of a bronze-lined aluminum alloy body and fitted with a chrome piston, the rammer can be equipped with shafts of varying lengths, flexible rubber handgrips, hand trigger and a quick-connect air line coupling. It will operate at low air consumption from a ¼-in. air supply line.

For More Details Circle No. 11—Page 195

Nickel Cast Electrode: Pacific Welding Alloys Mfg. Co., 310 North Avenue 21, Los Angeles 31, Calif.—Nickel cast electrode is recommended for repair welding of cast iron. The weld itself is easily machinable under all conditions of deposition, according to the manufacturer. Electrode can be operated from ac or dc current but reverse polarity is recommended.

For More Details Circle No. 12—Page 195

Steel Saw Bands: DoAll Co., 254 North Laurel Ave., Des Plaines, Ill.—Saw band combines characteristics of

Vibrator Helps To Produce Uniform Cores

COREBOX VIBRATOR is air powered and portable. It is designed for attachment to any size corebox and is said to result in a clean draw and accurate core dimensions. Vibrator is attached to a reinforcement or a 2 x 4 in. piece of wood nailed or screwed to the corebox. Unit is operated during the entire drawing operation, and the vibratory force is changed for cores of various sizes. Jaw opens to 4 in. to facilitate attachment, without damaging the corebox. Over-all dimensions are 3½ x 6⅞ x 8 in. Weight is 18 lb. Unit can be made to vibrate approximately 8000 times per minute.

Manufacturer states that the vibrator eliminates constant banging of the sledge hammer on coreboxes, saves time used in repairing broken edges, avoids damage to the corebox, draws faster and cleaner with no distortion in cores. Production of uniform cores is increased. The unit is manufactured by Cleveland Vibrator Co., 2828 Clinton Ave., West, Cleveland 13, O.

For More Details Circle No. 13—Page 195

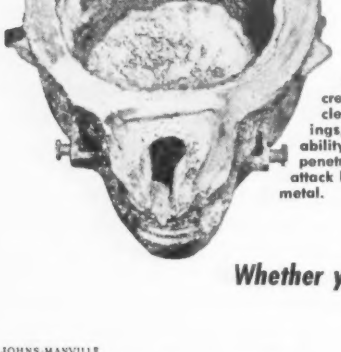
Line ladles for longer life

...Easily, Quickly

with J-M 3X Blazecrete®
the hydraulic-setting refractory

Easy to apply—3X Blazecrete—the 3000F refractory—is easily and quickly applied . . . mix with water like ordinary concrete, and slap-trowel to desired thickness. Air-cures without application of heat. Contains no harmful irritants . . . safe even for hand application. 3X Blazecrete is furnished as a dry mix, and may be stored indefinitely without deterioration.

Longer-lasting linings can be built with 3X Blazecrete because it is spall-resistant, withstands slagging action and has negligible shrinkage.



3X Blazecrete means cleaner castings, has great ability to resist penetration and attack by molten metal.

Send for free brochure on Blazecrete (RC-28A) describing its properties and uses. To obtain a copy—as well as additional application details—write Johns-Manville, Box 60, New York 16, N. Y. In Canada, Port Credit, Ontario.

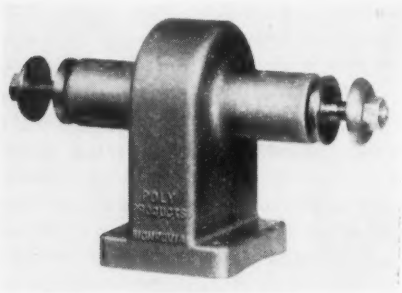
Whether you gun it... *or slap-trowel it...*

JOHNS MANVILLE JM PRODUCTS **Johns-Manville BLAZECRETE**
BUILDS BETTER REFRACTORY LININGS

high-speed steel with positive rake teeth to improve its cutting efficiency, while flexing over the carrier wheels of a band machine. It is said to retain its high tooth hardness at temperatures to 1050° F. Four widths from ¼ through 1 in. and four pitches, with a selection of eight blades, can be supplied.

For More Details Circle No. 14—Page 195

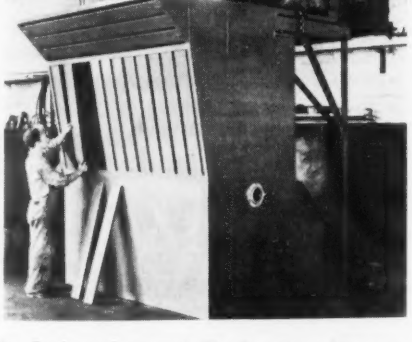
Bench Grinder: Poly Products Co., 230 East Pomona Ave., Monrovia, Calif.—Small bench grinder for light



weight is said to be useful where slower or faster than normal motor speeds are required. Shaft is precision-ground steel and balanced on permanently lubricated ball bearings. Housing is open in back and base for either rear or undertable drive. Spindle size is ½ in. diam x 11⅛ in. long. Thread is ½-2 ONF. Wheel capacity is 6 in. Polishing, buffing, sanding, brushing and finishing wheels may be used, as well as those for removing metal.

For More Details Circle No. 15—Page 195

Dust Collector: Schmieg Industries Inc., P. O. Box 4701, Detroit 34, Mich.—Packaged dust collector unit



is designed especially for foundry use at pouring and shakeout stations. It has a built-in reservoir that permits recycling of water so that only small quantities of make-up water are required. Fresh-water-fill manifold contains a solenoid valve to insure economic operation. Attached adjustable hood is removable for cleaning and

HERE ARE QUICK REVIEWS OF NEW LITERATURE—available to foundrymen as "idea" and reference information. Readers in the United States and Canada may obtain copies by using the attached cards. Readers in foreign countries should write direct to the manufacturer offering literature.

81. Planned Mechanization

Newaygo Engineering Co., Newaygo, Mich.—Booklet, "Planned Mechanization for Foundries," illustrates and describes line of foundry equipment coupled with engineering service to help foundrymen plan a mechanization program. General information, features and specifications of individual floor systems as well as complete sand handling systems and components are included.

82. Cupolas

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.—Bulletin FY-172-R offers sectional views, schematic drawings, sizes, capacities and specifications for several cupolas. List of advantages, description of tuyere and hot blast designs, chart showing number of brick and block required and accessory information also are included.

83. Foundry Ovens

Foundry Equipment Co., 1821 Columbus Rd., Cleveland 13, O.—Bulletin 54 contains information and pictures of installations of a complete range of types and sizes of tower, horizontal conveyor, car-type, transrack, rolling drawer, portable core and mold and dielectric ovens for foundry use.

84. Electric Furnaces

Pittsburgh Lectromelt Furnace Corp., 314 32nd St., Pittsburgh 30, Pa.—Catalog 9-A pictorially presents the various sizes and types of furnaces available for melting and refining of steel, iron, nickel and copper. Standard sizes of varying capacities with appropriate engineering data are included.

85. Tramp Iron Magnets

Dings Magnetic Separator Co., 4740 West Electric Ave., Milwaukee 46, Wis.—Catalog 1315-A presents descriptions, illustrations, application and engineering data on rectangular suspended tramp iron magnets to remove large quantities of iron chills, reinforcing wire and rods from tonnages of sand. Tips on magnet suspension also are included.

86. Steel Belt Conveyors

Sandvik Steel Belt Conveyors, Division of Sandvik Steel Inc., 1702 Nevins Rd., Fair Lawn, N. J.—Photographs and drawings give engineering and application information on conveying via a steel band. Basic features of conveyor and steel belt are described and details on characteristics, capacities, adaptations and design are included in 48-page, hard cover, permanently bound book.

87. Bin-Feeding Device

Gerotor May Corp., 1533 Maryland Ave., Baltimore 3, Md.—Folder describes application of steel-backed, neoprene, pulsating panels mounted on inside walls of storage bins to facilitate movement of bin contents. Pneumatic inflation and deflation of panels promotes free flow of material.

88. Electric Hoists

Wright Hoist Division, American Chain & Cable Co., York, Pa.—Booklet DH133B describes the electrical, mechanical and structural features of Frame 1 and 1½ electric hoists of ¼ to 1 ton and 1½ to 2 ton capacities, respectively. Prices, specifications and clearance data also are included.

89. Dump Buckets

Penn Iron Works Inc., Reading, Pa.—Standard sizes, dimensions, weights and application information on line of dumping buckets is contained in catalog. Tables on weights of materials and weights of iron and steel gages also are included.

90. Phenolic Resin

Reichhold Chemicals Inc., RCI Bldg., White Plains, N. Y.—Advantages of using a liquid, water-soluble phenolic resin for producing cores are detailed in technical bulletin F-5. Resin is said to reduce coring cycle from hours to minutes. Cores come

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out almost "pattern smooth," making hand filing, mudding or core washing generally unnecessary.

91. Oil Burning Equipment

Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.—Catalog 1043C, "Hauck Oil and Gas Burning Equipment for Foundries," describes gas and oil burning equipment for use in lighting cupolas, heating and drying ladles, drying molds, heating forehearth, drying spout linings, patching cores, preheating for welding, firing heat treating furnaces and other plant operations.

92. Industrial Ovens

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 1, O.—Specifications, illustrations and diagrams of basic line of box, multi-compartment, belt conveyor, floor, overhead conveyor, continuous and vertical industrial ovens are included in bulletin 200. Data on forced convection type heating systems, insulated enclosures and direct-fired air heaters also are included.

93. Mortars

North American Refractories Co., National City Bank Bldg., Cleveland 14, O.—Selection chart for temperature range, selection table for properties and other data to aid in choice of mortar for correct refractory application are contained in bulletin 104-A.

94. Scoop Loader

Jaeger Machine Co., 502 Dublin Ave., Columbus 16, O.—Specifications, engineering data and photographs of 12-cu-ft scoop loader in action are offered in catalog L12-4. Loader is designed for one-man bulk handling of a wide variety of jobs in and about the plant.

95. Gyratory Riddles

Great Western Mfg. Co., Leavenworth, Kans.—Descriptive folder illustrates several gyratory foundry riddles of varying sizes and capacities for screening molding and core sands of medium fine, coarse dry and sticky materials.

96. Aluminum Alloy

Frontier Bronze Corp., 4778 Packard Rd., Niagara Falls, N. Y.—Data book presents story of a high-strength natural-aging aluminum-zinc-magnesium-chromium-titanium alloy that requires no heat treatment.

97. Pistol Sprayer

Jas. A. Murphy & Co., 1421 High St., Hamilton, O.—Pistol sprayer for blackening molds and a spray gun for spraying molds and cores are illustrated and described in bulletin.

98. Airless Blast Cleaning

American Wheelabrator & Equipment Corp., 505 South Byrkit St., Mishawaka, Ind.—Description of airless blast cleaning process, equipment designed for a variety of purposes, typical finishes, chart of recommended abrasive sizes and case histories of successful applications are included in catalog 74-C.

99. Liquid Resin Coating

Acme Resin Corp., 1401 Circle Ave., Forest Park, Ill.—Folder details process using liquid-resin-coated sand in shell molding to provide clean finishes, strong and lightweight molds. Process is adaptable to every shell molding method, dump box, roll-over and blowing of either shells or cores.

100. Blast Nozzles

Norton Co., 43 New Bond St., Worcester 6, Mass.—Booklet on boron carbide pressure blast nozzles contains helpful suggestion on use of blast nozzles, instructions for their selection and use, and tables depicting standard sizes and fittings.

101. Bridge Cranes

Shepard Niles Crane & Hoist Corp., 1352 Schuyler Ave., Montour Falls, N. Y.—Bulletins 179 and 180 illustrate in-use applications of many crane installations, both cab and floor operated.

102. Cupola Collector

Claude B. Schneible Co., P.O. Box 81, North End Station, Detroit 2, Mich.—Engineering and application data dust on collector systems for control of cupola fly-ash and smoke are presented in bulletin 554.

103. Flask-Lift Machines

Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.—Bulletin 531 illustrates and describes several models of plain jar, portable jar, yoke-type, jar-squeeze, plain jar-squeeze and split pattern power squeeze flask-lift machines.

104. Drum Pump

Gray Co., 1022 Sibley St., N.E. Minneapolis 13, Minn. — Illustrated booklet 300-012 covers specifications of and applications for company's drum pumps for handling a variety of liquids with no pressurizing of drums.

105. Indicating Meters

Assembly Products Inc., Chesterland, O.—Several types of panel meters, indicating pyrometers and kiln pyrometers are described in bulletin G-9. Pricing and ordering information also is included.

106. High Frame Hammer

Chambersburg Engineering Co., Chambersburg, Pa.—Features, advantages, specifications and dimensions of single high-frame hammer for flat die, blacksmithing or tool dressing needs are described in bulletin 1-L-4.

107. Refractories

Johns-Manville, Box 60, New York 16, N. Y.—Brochure RC-28A describes the properties and applications of several hydraulic-setting refractories for services through 3000° F.

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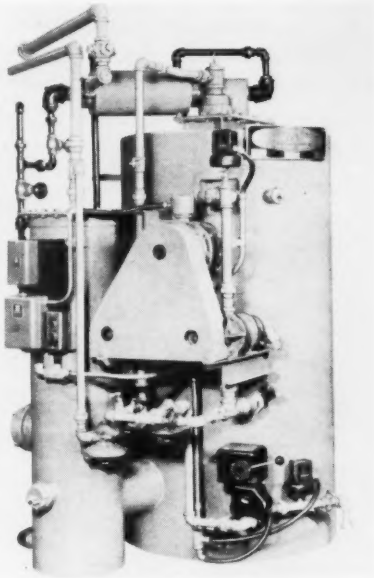
provides for entrapment of hazardous fumes and dust so that it does not interfere with overhead crane carrying work to and from the operator.

For More Details Circle No. 16—Page 195

Gas Generator: Holcroft & Co., 6545 Epworth Blvd., Detroit 10, Mich.—Compact exo-endothermic gas generator for providing gas atmosphere for heat treat furnaces requires 20 sq ft of floor space and reportedly can be used with all types of furnaces. According to manufacturer, it can produce gas atmospheres between the



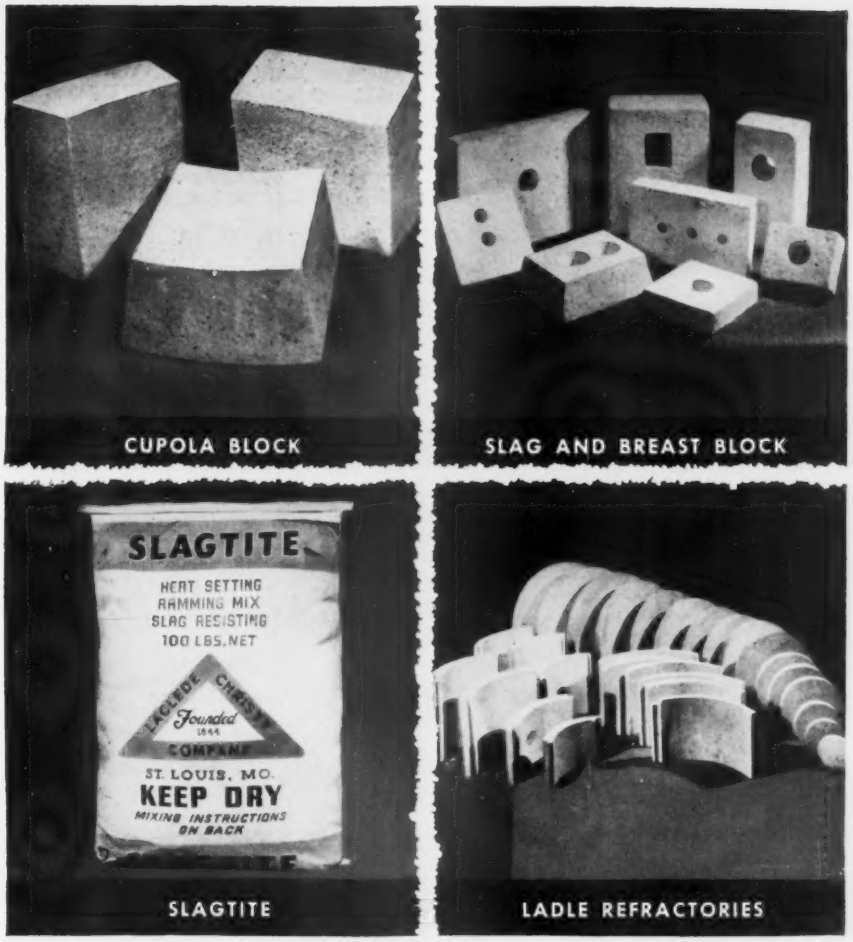
limits of perfect combustion and modified "302." By adjustment the generator can make a nonexplosive atmosphere for heat treating below the explosive limits required for atmosphere tempering, annealing and stress relief of ferrous alloys as well as hardening, annealing and tempering of nonferrous alloys.

For More Details Circle No. 17—Page 195

Tubeaxial Fans: Propellair Division, Robbins & Myers Inc., Springfield, O.—Line of belt-driven tubeaxial propeller fans is designed for handling corrosive exhaust, high-temperature, explosive fumes and similar difficult air-moving applications. Available in five sizes from 16 through 36 in. the fans have air delivery ratings to 26,000 cfm. Motor-mount assembly permits 3-in. belt adjustment and is drilled to accommodate any motor from ¼ to 5 hp, 1725 rpm. Prelubricated ball bearings are sealed to prevent lubrication contamination. When specified, special corrosion-resistant coatings for fan are factory applied.

For More Details Circle No. 18—Page 195

Air Compressor: Ingersoll-Rand, 11 Broadway, New York 4, N. Y.—Electric-driven air compressor of 125 hp has been added to company's line



Recommendations for foundries:

Save money with LACLEDE-CHRISTY REFRACTORIES

Sound, sensible reasons support the "save money" idea when Laclede-Christy refractories enter your foundry.

Laclede-Christy offers a complete refractory service to foundries—fire brick, cupola block, preburned shapes for ladle linings, and a graphitic plastic refractory for monolithic ladle linings.

You also save with Laclede-Christy's mixed carload shipment plan—to gain carload prices. Laclede engineers may also help you save by recommending money-saving uses of foundry refractories.

You get fast delivery from Laclede's nearby source of supply. Call your Laclede-Christy representative for prompt action.

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of air-cooled, two-stage stationary compressors. Features of the unit are single core, horizontal flow intercooler, new shrouding, force-feed lubrication and free-air unloading. Either constant speed or dual control can be furnished. Other compressors in the line are 25, 40, 50, 75, and 100 hp.
For More Details Circle No. 19—Page 195

Metal Cleaner: Chemclean Products Corp., 610 Warren St., Brooklyn 17, N. Y.—Multi-purpose alkaline compound is said to remove rust, scale, paint, grease or oil in one operation. Material is noncorrosive to sound ferrous metals and can be used as a soak or electrolytically with reverse or direct current. Manufacturer claims it eliminates the possibility of hydrogen embrittlement caused by acid descaling and eliminates the need for acid pickling in rust removal.
For More Details Circle No. 36—Page 195

Hydraulic Fluids: Monsanto Chemical Co., Organic Chemical Division, St. Louis 4, Mo.—Two fire-resistant hydraulic fluids are engineered to meet special high and low viscosity requirements. One, with a viscosity index of 170 and a pour point of −55° F, is for use in outdoor installations where systems are exposed to low ambient temperatures. The other has a viscosity index of 30 and a pour point of 15° F designed for presses, compressors and die casting equipment. Samples are available on request.
For More Details Circle No. 37—Page 195

Spectrometer: Applied Research Laboratories, San Fernando Rd. and Palmer, Glendale, Calif.—X-ray scanning spectrometer, suitable for qualitative or semiqualitative analysis, reportedly provides accuracy comparable to the best chemical methods. Speeds reportedly are similar to direct-reading optical emission. Liquids, powders and solids can be analyzed.

Since the method is nondestructive, standard samples last almost indefinitely. Instrument is designed for either analytical research or production control.
For More Details Circle No. 20—Page 195

Vibrating Pen: Newage International Inc., 235 East 42nd St., New York 17, N. Y.—Electric pen through its electric magnetic vibrating system will engrave any marking on all metals, according to its manufacturer. Through the system with a writing point at its terminal, a short arc is produced which performs the engraving. Marks can be removed only by grinding, filing or destroying the article. Regular current reduced through a transformer to 2 to 7 volts is said to make the tool safe.
For More Details Circle No. 21—Page 195

Band Saw Blade: American Saw & Mfg. Co., 67 Boylston St., Springfield 1, Mass.—Band saw blade with positive rake teeth is recommended for cutting nonferrous metals, wood and plastics. Teeth have a forward inclination so they "hook" themselves

Typical centrifugal castings of "Berylco" beryllium copper, poured by the Janney Cylinder Company, Philadelphia, for classified use.

The great natural advantages of beryllium copper—its combination of high strength, thermal and electrical conductivity, resistance to corrosion and wear—are enhanced by centrifugal casting, the Janney Cylinder Company finds. "Berylco" centrifugal castings have a dense uniform structure, of small grain size, free from porosity, gas holes, etc. "Berylco" castings made this way approach wrought material in final properties. Rockwell hardnesses run 3-5 points higher than a conventional casting of the same analysis. Such physical properties as elongation, yield strength, tensile strength, and reduction in area are sometimes increased 10-20%. Directional property differences are decreased.

The castings shown here weigh in the neighborhood of 225 lb. General size limitations are 36″ O.D. for tubes, 48″ O.D. for rings, 3″ maximum wall thickness, and 120″ maximum tube length.

CAN YOU HANDLE "BERYLCO"?

We will be glad to assist any foundry in handling beryllium copper casting alloys. Write, wire or phone today. For a complete listing of available alloys, write for your free copy of the "Berylco Product Directory."

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into the work to cut with greater ease than conventional zero rake teeth, according to the manufacturer. Blade also features rounded gullets to aid chip clearance. Teeth are

flame hardened to 63-65 Rockwell C and blade back is 35-30 Rockwell C. Widths from ½ to 1 in. are available, with two to six teeth per in. Packaging includes 100, 250 and 500 ft coils, also blades cut to length and welded.

For More Details Circle No. 22—Page 195

Belt Grinder: Anchor Machinery Co., 229 West Orange Grove Ave., Burbank, Calif.—Belt grinder and sander operates at belt speeds as high as over 10,000 sfm. These speeds are reported to have increased production 300 per cent and belt life up to 3000 per cent. Even previously discarded belts are said to have been used with efficiency. At super speeds, belts resist loading, operation is smooth, less work pressure is required, and "bumping" is absent. The super speeds can be used with ferrous and nonferrous castings, die castings and various nonmetallics.

For More Details Circle No. 23—Page 195

Aluminized Suit: Wheeler Protective Apparel Inc., 230 West Huron St., Chicago 10, Ill.—Aluminized suit for protecting fire rescue workers is made from aluminized tropic-weight asbestos fabric said to reflect up to 90 per cent of heat. Suit lining is neoprene coated fiberglass for additional resistance to heat, abrasion, water, oil, grease and acids. An air respirator is part of the suit and provides enough air for about 15-minutes' work at extreme exertion.

For More Details Circle No. 38—Page 195

Two-Pen Recorder: Bristol Co., Waterbury 20, Conn.—Electronic potentiometer recorder can make two continuous records at same time on a 12-in. round chart. Applications include the taking of wet and dry resistance bulb temperatures for humidity measurements, Btu and temperature differential measurements and speed of rotation from two different points. Potentiometer instruments can be used to measure and control any variable which can be translated into an electrical quantity such as temperature, pH, consistency, speed, and weight.

For More Details Circle No. 39—Page 195

Work Measurer: Stewart Instrument Co., 6507 Grand River Ave., Detroit 8, Mich.—Work measurement instrument installed on electric grinders, belt sanders, band saws, abrasive cut-off machines and arc welders furnishes a means of determining amount of work performed and op-

erator's pay, each day, without complicated setting and maintaining of

This grinder maintains 9500 S.F.P.M. all the way down to the flanges. By merely turning hand wheel, guard is adjusted and spindle speed is increased simultaneously in relation to worn wheel. No wrenches or tools are needed for this adjustment.
Available in both single and twin wheel construction.

Write for catalogue 44 today.

STANDARD'S *single wheel snagging grinders*

One of the 46 Single Wheel Infinitely Variable Speed Snagging Grinders now at work at Ford's ultra-modern Cleveland Foundry.

Here are the results that Standard type 33V Grinders deliver every day, every time:

- Higher Production
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- Longer Wheel Life
- Maximum Economy
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Standardize with
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MACHINE TOOLS
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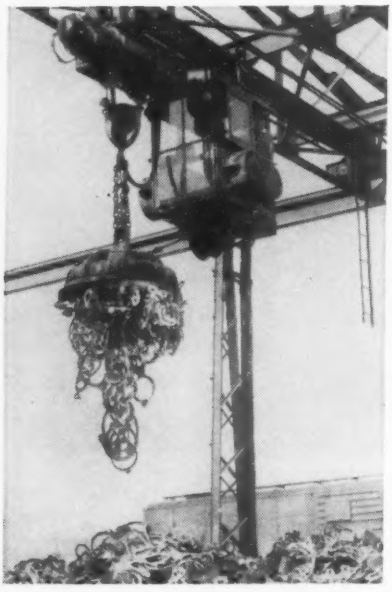
SHEPARD NILES Floor-Operated Hoist

Operator mainly occupied with other duties. Hoist used for fast, efficient handling of relatively short hauls.

WHICH HOIST is RIGHT FOR YOUR JOB?



SHEPARD NILES Cab-Operated Hoist

Operator in cab moves loads along at high speeds . . . occupies best vantage point for spotting or stacking materials.

Let the Shepard Niles representative in your area guide you in your choice. He specializes in through-the-air handling . . . can help you select the hoist that best fits your job. Write Shepard Niles today for latest bulletins describing both types of hoists . . . and ask to have a representative stop by your office.

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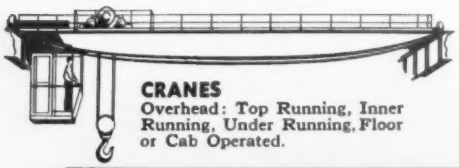
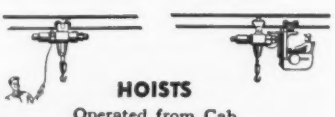


CRANES
Overhead: Top Running, Inner Running, Under Running, Floor or Cab Operated.



HOISTS
Operated from Cab, Floor or Pulpit.

SHEPARD NILES
CRANE AND HOIST CORPORATION

1362 SCHUYLER AVE., MONTOUR FALLS, N.Y.

piece work incentives. Instruments are leased, inspected, sealed and serviced and accuracy maintained by the manufacturer.

For More Details Circle No. 24—Page 195

Fan: McLean Engineering, P.O. Box 228, Princeton, N. J.—"Man Cooler" fan, which mounts anywhere and delivers 5600 cfm with its 24-in. blades, is designed for comfort cooling in industrial plants. All moving parts are rubber isolated from flexible frame and steel case. Safety guards are provided both front and rear. While 115-v, 60-cycle motors are supplied as standard, other voltages and types may be ordered.

For More Details Circle No. 25—Page 195

Dust Collectors: Aget Mfg. Co., Adrian, Mich.—Standard models of industrial dust collecting equipment,

without dust bin attached, are for installations where collected dust runs to high volume, or where floor space is at a premium. Upon installation of the collector, a storage bin is constructed by customer to meet his particular storage and dust removal requirements, and placed outside or inside where space allows. Collector itself can be located overhead in girders or on roof and connected to bin by pipe extending downward at an angle no less than 45 degrees.

For More Details Circle No. 26—Page 195

Vibrating Screen: Hewitt-Robins Inc., Stamford, Conn.—Vibrating screen for screening and sizing coal, ore, chemicals and other bulk materials reportedly overcomes problem of screen surface clogging by use of controlled resonance induced by a relatively small mechanical exciter that produces powerful vibrations. All vibration is contained with-

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Highest quality foundry coke for over fifty years.
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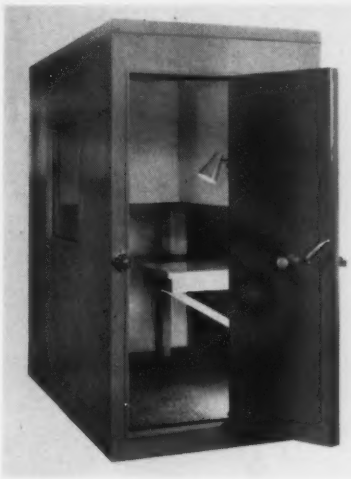
Serving Industry Since 1883

in a dynamically balanced system designed to reduce energy losses. Screen frames are mounted on a system of rubber and steel springs. Various sizes from 4 x 10 ft to 6 x 28 ft are available.

For More Details Circle No. 27—Page 195

Sound-Proof Room: Architectural Products Division, Burgess-Manning Co., 5970 Northwest Highway,



Chicago, Ill.—Portable room, 7 ft high x 4 ft wide x 7 ft deep, is used for employee hearing tests and has built-in high capacity sound absorption and forced mechanical ventilation. Interior is equipped with a plastic top desk, wall outlet for testing apparatus and carpeted floor. It can house patient, observer and technician. Unit is shipped knocked-down and reportedly can be erected in three or four hours.

For More Details Circle No. 28—Page 195

Electric Cable Hoist: David Round & Son Inc., Box 883, Cleveland 22, O.—Electric cable hoist is fully

enclosed, compact, and push-button controlled and is said to achieve close headroom for electric hoist construction. Gears are permanently lubricated with a molybdenum compound. Load protection is provided by a solenoid-operated motor brake and a heavy-duty friction brake. Capacities include ¼ and ½ ton which operate on 110/220-v, single-phase, 60-cycle or 220/440 v, three-phase, 60-

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HOW CAN THIS FOUNDRY Save Money IF

(a) Production per day, Grey Iron, is 150 Tons
(b) Pounds Castings per day 300,000 Lbs.
(c) Value Cstgs. per day @ 10c per lb. $30,000.00
(d) Scrap Loss per day 6%
(e) Loss per day in Dollars $1,800.00
(f) Loss per year (200 days x $1,800.00) $360,000.00

SOLUTION—WITH DIETERT-DETROIT SAND CONTROL EQUIPMENT

(a) Reduction possible by instituting Basic Sand Control Program 2%
(b) Scrap Loss Reduction of 2% results in Total Yearly Savings of $120,000.00
(c) Approx. Total Cost of Basic Sand Control Equipment 700.00
(d) Net Savings possible, First Year through use of Sand Control Equipment $119,300.00

Control the three fundamental physical properties of foundry molding sands (Moisture, Permeability and Strength). Reduce scrap losses and improve the quality of castings produced in any foundry with the help of Dietert-Detroit Sand Control Equipment.

REFERENCE—"Tools for Control" published by the Harry W. Dietert Co. Copies available upon request.

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CONTROL EQUIPMENT
SAND · MOLD · MOISTURE
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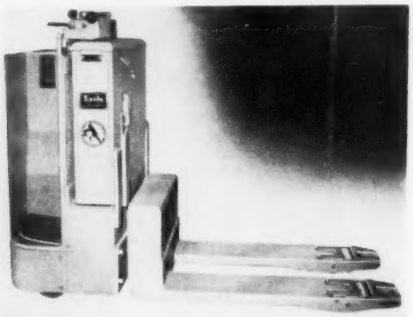
9330 ROSELAWN AVE. · DETROIT 4, MICHIGAN

cycle, and a 1-ton model which uses 220/440 v, three-phase, 60-cycle current.

For More Details Circle No. 29—Page 195

Low-Lift Truck: Lewis-Shepard Products Inc., Watertown, Mass.—Low-lift rider trucks in capacities up



to 4000 lb in both pallet type for handling single or double face pallets and platform type for skid platforms have been added to company's materials handling equipment. Operator is protected by reinforced sheet steel backrest and has all controls in one finger-tip location. Models are equipped with three speeds forward and reverse with dynamic braking. Lift is 4 in. A variety of lengths and widths can be supplied.

For More Details Circle No. 30—Page 195

Hardness Tester: Tinius Olsen Testing Machine Co., 123 Easton Rd., Willow Grove, Pa.—Hardness tester can be used with chain, magnetic and "C" clamps to test specimens ranging from metal strips 0.002-in. thick to cylinders over 8 ft in diam. Accuracy is said to be in the 16 to 800/1000 D. P. H. range (from softer than 0 on the Rockwell B scale to 64/69 Rockwell C). Comparative results can be obtained up to 1500 D. P. H. (75 Rockwell C). Unit is portable and can be fastened directly to parts of any size. A minute, 136-degree pyramidal diamond is pressed into the metal by an accurately controlled load of up to 40 kg. A calibrated microscope measures the indentation with an accuracy of 1 micron—about 40 millionths of an inch. Ball-type indenters 1 and 2-mm in diam also are available.

For More Details Circle No. 31—Page 195

Elevating End-Gate: Gar Wood Industries, Wayne, Mich.—Elevating end-gate for trucks and trailers has lifting capacity of 2000 lb and is available with a choice of eight platforms. Four gate sizes range from 28 x 84 in. to 36 x 90 in. for both standard and ramp-type platforms. Three arms extend from the truck to the gate, which is mounted so that there is no loss of ground clearance. All operations are powered by one double-acting cylinder. Levers control all operations, and double safety

latches hold both sides of the gate when it is raised. An overhead valve protects against raising or lowering the gate when it is overloaded.

For More Details Circle No. 32—Page 195

Diffusion Pump: Naresco Equipment Corp., National Research Corp., 160 Charlemont St., Newton Highlands 61, Mass.—High-vacuum diffusion pump for moderate-sized vacuum systems is a 10-in.-diam fractionating diffusion pump which also can be used as a booster pump. With proper pump fluid, the unit has a speed of 1700 liters per second in the pressure range from 5×10^{-4} to 5×10^{-5} mm of mercury and has a throughput of 3800 liters per second at 10 microns. When it is operated as a booster pump, with proper fluid, pumping speed at 1 micron is 2000 liters per second with a throughput of 6000 liters per second at 10 microns.

For More Details Circle No. 33—Page 195

Metal Filler: Destiny Products Co., 2970 West Grand Blvd., Detroit 2, Mich.—Aluminum base, putty-type filler compound can be applied without heat, as a filler, to other metals, wood, plastic, fibre glass and plaster. Filler reportedly also can be used in repair of patterns, molds, dies, models, matchplates and valves. In machining, is is said the filler can be drilled, milled, tapped, sanded, filed, ground and generally worked as any other metal alloy. About 7 hours are needed for handling cure and 24 hours are required for the filler to reach its ultimate hardness in any molded shape.

For More Details Circle No. 34—Page 195

Gage Blocks: Ellstrom Standards Division, Dearborn Gage Co., 22038 Beech St., Dearborn, Mich.—Closer tolerances in the company's entire line of square and rectangular gage blocks are said to assure finer degree of accuracy and 50 to 75 per cent longer wear life than before. Guaranteed tolerances for working accuracy blocks from 0.010 to 1.000 in. now are +0.000008, −0.000002 in.; from 1.000 to 20.000 in., new tolerances are +0.000006, −0.000002-in. per in. of length. All are guaranteed unconditionally to check within 0.000006-in. for flatness and parallelism. New tolerances for inspection accuracy blocks from 0.010 to 1.000 in. are +0.000004-in., −0.000002-in.; for blocks from 1.000 to 4.000 in., +0.000003-in., −0.0000015-in. per in. of length; from 4.000 to 8.000 in., +0.0000025-in., −0.0000015-in. per in.; from 8.000 to 20.000 in., +0.000002 in., −0.000001-in., per in. Flatness and parallelism of these blocks are guaranteed to within 0.000004-in.

For More Details Circle No. 35—Page 195

STANDARD HAS ENGINEERED AND BUILT FOUNDRY CONVEYORS SINCE 1906

Standard Conveyor Company has an experience record of almost a half century — engineering and building foundry conveyors. On any foundry handling problem Standard can aid you to select and install conveyors that will give you reduced handling time — uninterrupted smooth flow in production — careful safe handling of light or heavy molds — better storage facilities — and help conserve and better utilize existing foundry space.

Available in a wide range of sizes, weights and types — equipped with shielded bearings expressly designed for severe foundry service — to suit a wide variety of foundry applications. Whatever your specific need, Standard is qualified by experience and facilities to recommend and furnish the right type of conveyors.

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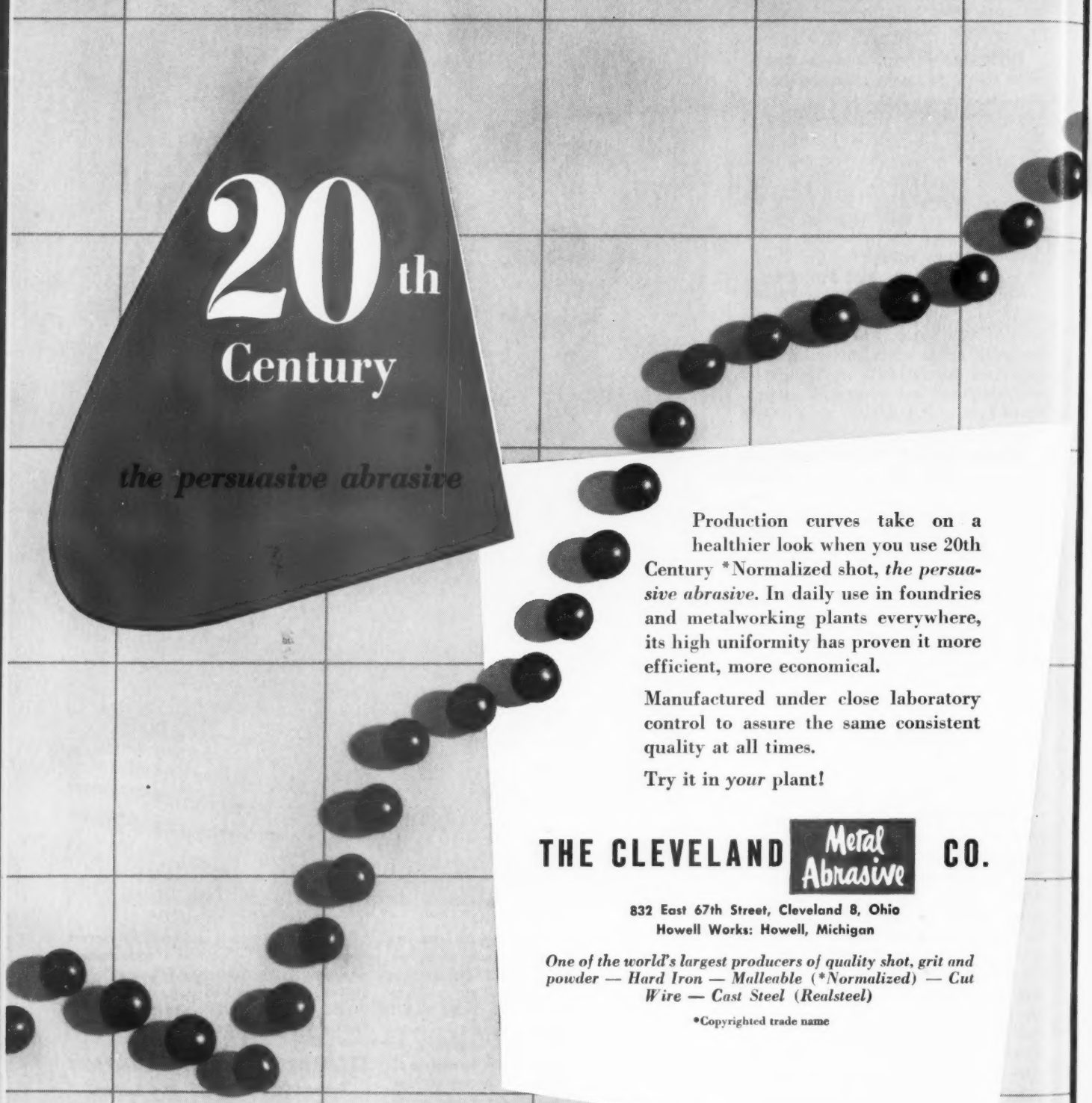
Send for Standard's special catalog "Conveyors for Foundries" — a valuable reference book illustrating and describing conveyor installations in leading foundries.

ENGINEERED FOR LOW-COST PRODUCTION



Production curves take on a healthier look when you use 20th Century *Normalized shot, *the persuasive abrasive.* In daily use in foundries and metalworking plants everywhere, its high uniformity has proven it more efficient, more economical.

Manufactured under close laboratory control to assure the same consistent quality at all times.

Try it in *your* plant!

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*One of the world's largest producers of quality shot, grit and powder — Hard Iron — Malleable (*Normalized) — Cut Wire — Cast Steel (Realsteel)*

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Foundry Statistics

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1953	970,506	578,749	.....
1954			
Apr.	74,515	39,102	69,094
4 mo.	298,223	162,285	.....
May	67,856	37,306	67,040
June	72,820	41,121	60,163
July	50,893	25,243	63,711
Aug.	59,259	34,528	62,494
Sept.	58,015	33,929	66,742
Oct.	64,321	36,956	71,090
Nov.	70,030	41,609	80,686
Dec.	80,599	49,005	85,064
Total	812,016	461,982	.....
1955			
Jan.	82,028	48,000	99,817
Feb.	85,979	48,721	101,766
Mar.	102,364	60,063	99,730
Apr.	101,226	57,397	104,091
4 mo.	371,597	214,181	.....

ALUMINUM

(Shipments of castings—1000 pounds)

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1953	658,022	214,553	200,025	239,330	.....
1954					
Apr.	53,006	14,073	18,091	20,366	91,853
4 mo.	211,849	57,935	71,563	80,474	.....
May	47,663	12,461	16,312	18,368	83,848
June	48,061	12,442	17,105	17,886	79,126
July	39,636	11,299	13,749	14,004	76,513
Aug.	42,429	11,252	15,335	15,213	76,684
Sept.	46,240	10,777	16,641	18,228	79,873
Oct.	53,901	12,765	19,238	21,245	88,518
Nov.	55,224	12,934	20,396	21,296	94,491
Dec.	64,045	13,753	23,629	26,017	99,556
Total	609,057	155,558	213,968	232,731	.....
1955					
Jan.	64,414	13,358	23,679	26,819	102,382
Feb.	66,869	13,579	24,319	28,234	108,939
Mar.	78,958	16,019	29,029	33,229	110,046
Apr.	73,049	14,041	28,028	30,208	108,761
4 mo.	283,290	56,997	105,055	118,490	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments			Unfilled Orders[2]
	Total	Sand	Perm. Mold	
1953	990,496	888,369	61,316	.....
1954				
Apr.	72,900	65,418	4,732	34,111
4 mo.	289,666	257,317	19,216	.....
May	67,859	61,469	3,755	31,568
June	70,777	64,328	3,567	30,743
July	56,380	51,070	3,073	30,872
Aug.	68,891	63,389	3,547	28,883
Sept.	68,267	62,152	3,637	31,087
Oct.	70,276	63,855	3,619	30,296
Nov.	70,020	63,065	4,089	27,508
Dec.	72,421	65,159	4,346	31,954
Total	834,557	751,804	48,849	.....
1955				
Jan.	72,233	64,540	4,678	30,864
Feb.	75,253	67,768	4,598	37,520
Mar.	92,149	83,149	5,649	42,940
Apr.	84,183	75,903	5,152	51,111
4 mo.	323,818	291,360	20,077	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1953	34,517	31,469	.....
1954			
Apr.	2,068	1,857	7,358
4 mo.	9,120	8,060	.....
May	1,738	1,541	7,522
June	2,034	1,820	8,296
July	1,924	1,712	8,073
Aug.	2,157	1,944	7,795
Sept.	2,059	1,855	7,474
Oct.	2,092	1,876	7,294
Nov.	2,161	1,906	6,867
Dec.	2,287	2,031	6,678
Total	25,572	22,745	.....
1955			
Jan.	2,305	2,067	7,236
Feb.	2,160	2,009	7,376
Mar.	2,572	2,311	7,011
Apr.	2,633	2,405	6,800
4 mo.	9,670	8,792	.....

PRODUCTION WORKERS

Estimated Number

(Thousands)

	Apr. 1955	Mar. 1955	Apr. 1954
Ferrous	205,400	200,700	188,500
Nonferrous	71,300	70,400	61,700

Average Weekly Earnings

Gray Iron	83.13	81.54	72.56
Malleable Iron	84.60	82.96	72.58
Steel	85.08	84.46	73.68
Nonferrous	84.24	85.28	78.01

Average Weekly Hours

Gray Iron	42.2	41.6	35.8
Malleable Iron	42.3	41.9	37.8
Steel	41.1	41.0	37.4
Nonferrous	40.5	41.0	39.2

Labor Turnover Rate (April)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	5.1	4.2	2.9	0.6
Malleable Iron	5.6	3.8	2.4	0.3
Steel	5.8	2.8	1.5	0.9
Nonferrous	4.0	3.9	1.8	1.5

Source: Bureau of Labor Statistics

GRAY IRON CASTINGS—SHIPMENTS (Net Tons[1])

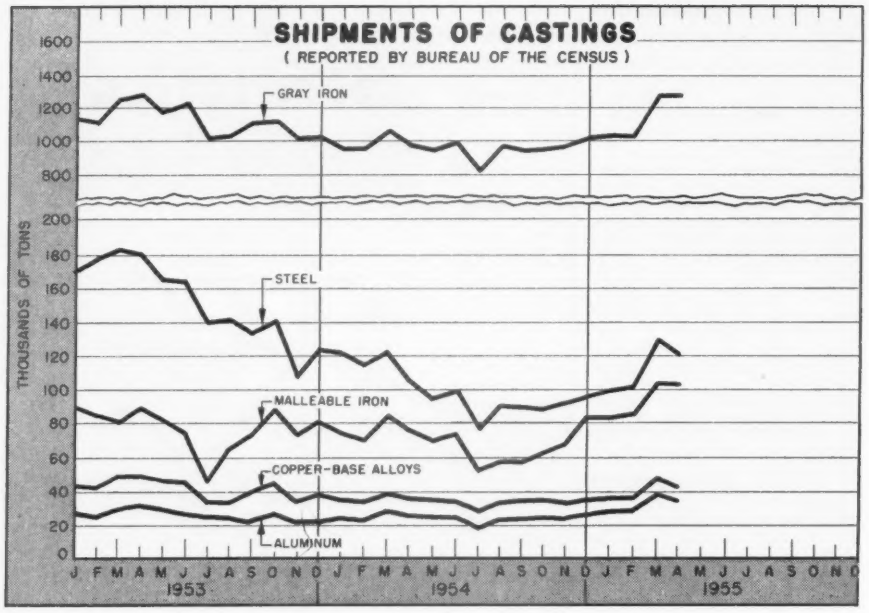
	All Castings		Miscellaneous Castings		Heavy Steel Ingot Molds		Chilled Railroad Car Wheels	Pressure Pipe & Fittings	Soil Pipe & Fittings	Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	Total	Total[3]	Total[3]	
1953	13,707,902	7,494,843	8,449,837	3,675,454	2,829,159	1,389,483	467,142	1,285,598	677,166	.....
1954										
Apr.	995,052	528,027	657,126	263,147	126,083	56,114	29,075	116,420	66,348	826,491
4 mo.	3,910,493	2,061,865	2,556,238	1,059,230	590,741	253,272	123,871	412,880	226,773	.....
May	943,335	516,475	605,385	247,623	122,839	57,106	27,144	122,514	65,453	775,278
June	986,810	556,047	616,317	261,133	141,712	70,060	30,883	130,503	67,395	803,570
July	821,151	449,621	510,173	209,294	131,180	62,681	22,902	98,810	59,086	828,924
Aug.	934,644	541,904	569,790	250,702	140,165	69,897	29,134	127,255	68,300	829,505
Sept.	921,232	533,909	559,934	248,124	139,679	68,053	25,374	124,821	71,424	810,654
Oct.	942,934	552,022	570,365	253,802	150,282	79,191	23,599	130,326	68,362	789,117
Nov.	997,301	547,447	623,390	258,933	167,983	85,703	25,723	118,480	61,725	759,613
Dec.	1,074,258	563,699	680,700	276,045	200,044	97,936	27,229	111,082	55,203	744,633
Total	11,532,158	6,322,989	7,292,292	3,064,886	1,784,625	843,899	325,859	1,376,671	743,721	.....
1955										
Jan.	1,091,923	563,153	712,097	282,386	192,132	97,007	25,783	100,638	61,273	782,656
Feb.	1,106,165	578,171	720,304	291,675	196,118	99,794	27,401	95,285	67,057	852,168
Mar.	1,314,918	688,733	847,874	334,287	217,571	109,681	36,732	129,746	82,995	934,224
Apr.	1,293,678	679,867	819,872	319,149	216,116	108,490	35,415	145,871	76,404	966,057
4 mo.	4,806,684	2,509,924	3,100,147	1,227,497	821,937	414,972	125,331	471,540	287,729	.....

STEEL CASTINGS—SHIPMENTS (Net Tons[1])

	All Castings			Carbon			Alloy			Unfilled Orders[2]
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	
1953	1,834,197	1,400,013	321,010	1,276,729	959,493	293,491	557,468	417,148	27,519	.....
1954										
Apr.	105,788	78,754	11,031	72,118	52,652	9,538	33,670	26,365	1,493	197,857
4 mo.	467,376	353,301	64,850	322,689	240,315	58,924	144,687	114,570	6,744	.....
May	94,610	70,596	9,454	64,546	46,768	8,342	30,064	22,945	1,112	182,502
June	100,022	72,881	8,639	69,021	48,370	7,552	31,001	24,554	1,087	169,594
July	75,848	53,207	5,815	50,453	33,461	4,964	25,395	19,746	851	170,567
Aug.	89,590	66,792	9,844	61,344	44,236	8,148	28,256	22,556	1,196	168,303
Sept.	88,359	64,722	8,668	59,039	41,735	7,690	29,320	22,987	978	158,823
Oct.	87,085	64,004	8,580	56,705	39,872	7,596	30,380	24,132	984	154,079
Nov.	87,659	64,812	7,742	56,057	40,085	6,624	31,602	24,727	1,118	175,715
Dec.	93,547	69,843	12,489	62,967	45,632	10,469	30,841	24,211	1,020	179,148
Total	1,184,096	880,158	135,581	802,821	580,474	120,309	381,285	303,428	15,090	.....
1955										
Jan.	98,238	75,044	13,809	67,397	49,816	12,762	30,841	25,228	1,047	201,839
Feb.	106,430	80,729	16,501	74,709	55,014	15,381	38,945	25,715	1,120	202,301
Mar.	127,460	98,926	19,339	88,867	68,013	17,887	34,933	30,913	1,452	215,059
Apr.	120,053	92,237	16,646	84,247	63,244	15,163	36,806	28,993	1,483	221,336
4 mo.	452,181	346,936	66,295	315,220	236,087	61,193	141,525	110,849	5,102	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.

FOUNDRY STATISTICS



COMMERCIAL HEAT TREATING

(National Billings of Metal Institute Members)

	1953		1954		1955	
	No. Reporting	Total Reported	No. Reporting	Total Reported	No. Reporting	Total Reported
Feb.	55	2,630,485	58	2,272,074	63	2,106,800
Mar.	52	2,924,713	59	2,345,010	63	2,500,000
Apr.	55	2,904,736	60	2,179,445	62	2,452,500
May	56	2,819,628	62	1,871,175	62	2,516,300
5 mo.		14,176,827		10,887,141		11,675,600
Annual total		31,733,067		24,244,368		.....

COKE PRODUCTION AND CONSUMPTION

(Net tons)

	Production	Consumption Total	Consumption By Foundries
1953	78,467,806	78,227,414	2,915,420
1954			
Apr.	4,693,036	4,569,843	212,272
4 mo.	20,541,368	20,307,376	875,823
May	4,802,245	4,656,950	204,958
June	4,640,064	4,683,726	194,664
July	4,618,665	4,555,701	170,617
Aug.	4,510,603	4,501,477	195,344
Sept.	4,490,603	4,434,650	191,607
Oct.	5,082,374	5,100,135	208,418
Nov.	5,230,237	5,283,916	221,391
Dec.	5,610,564	5,615,228	217,104
Total	59,526,723	59,139,159	2,479,926
1955			
Jan.	5,805,926	5,862,113	234,784
Feb.	5,394,166	5,519,241	242,282
Mar.	6,235,909	6,306,723	286,072
Apr.	6,135,767	6,173,004	277,981
4 mo.	23,571,768	23,861,081	1,041,119

INGOT BRASS AND BRONZE

(Shipments in net tons)

	1954	1955
Jan.	20,661	25,201
Feb.	19,920	25,349
Mar.	23,653	29,713
Apr.	24,746	27,641
May	22,269	23,708
June	22,348	.....
July	17,074	.....
Aug.	21,684	.....
Sept.	22,464	.....
Oct.	24,080	.....
Nov.	23,061	.....
Dec.	21,273	.....
Total for year	263,233	.....

ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments Total	Shipments For Sale	Unfilled Orders[2]
1953	521,253	349,022	.....
1954			
Apr.	38,968	25,211	51,388
4 mo.	178,205	113,623	.....
May	36,793	23,671	46,726
June	40,708	26,890	47,537
July	28,306	18,605	43,231
Aug.	34,639	24,898	46,288
Sept.	36,594	25,617	56,006
Oct.	39,072	27,337	64,500
Nov.	48,437	35,207	62,750
Dec.	54,410	35,211	69,403
Total	434,785	295,587	.....
1955			
Jan.	58,586	35,472	70,691
Feb.	58,585	35,893	73,858
Mar.	71,811	44,048	81,363
Apr.	71,595	45,477	81,756
4 mo.	260,577	160,890	.....

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1954	1955
Jan.	173.8	81.0
Feb.	99.9	90.4
Mar.	82.7	163.6
Apr.	125.3	178.6
May	80.8	145.7
June	86.4	....
July	68.8	....
Aug.	75.6	....
Sept.	68.3	....
Oct.	147.5	....
Nov.	61.4	....
Dec.	113.9	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent (monthly average). This is a new base period. Source: Foundry Equipment Manufacturers Association.

IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

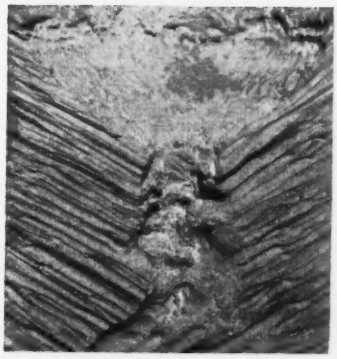
	All Scrap Total	By Types of Furnace: Cupola Total	Air Total	Electric Total
1953	69,005,976	9,676,463	1,026,334	8,263,880
1954				
Mar.	4,637,573	783,529	82,337	517,702
3 mo.	13,597,297	2,199,399	220,802	1,485,333
Apr.	4,582,862	748,766	79,183	518,048
May	4,776,603	710,159	67,368	506,582
June	4,664,561	725,910	75,306	515,019
July	3,909,336	565,275	45,920	420,564
Aug.	4,164,703	671,631	65,336	486,596
Sept.	4,298,495	675,593	68,860	500,349
Oct.	4,782,488	710,127	67,678	528,432
Nov.	4,928,850	737,286	71,844	573,298
Dec.	5,075,563	798,435	92,910	566,223
Total	54,780,758	8,542,581	855,207	6,100,444
1955				
Jan.	5,416,052	813,682	90,622	614,824
Feb.	5,350,452	823,465	91,916	577,296
Mar.	6,313,717	993,266	113,198	727,401
3 mo.	17,080,221	2,630,413	295,736	1,919,521

PIG IRON PRODUCTION AND CONSUMPTION

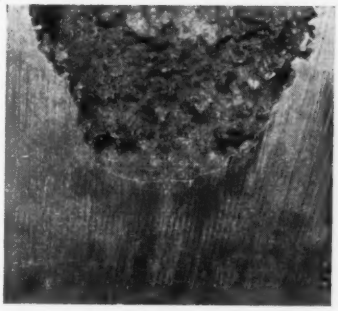
	Production** (standard grades—net tons) Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace—gross tons) Total	Cupola	Air	Electric
1953	74,879,511	2,599,307	3,736,431	60,465,016	8,347,825	66,637,364	4,918,480	272,311	164,267
1954									
May	4,572,252	154,768	231,479	3,741,671	444,334	4,188,269	367,437	16,453	16,531
5 mo.	24,224,438	864,073	1,298,895	19,772,249	2,289,221	21,805,264	1,847,811	99,252	64,610
June	4,683,629	175,759	200,154	3,853,444	454,272	4,297,531	375,601	18,545	14,196
July	4,590,076	182,130	182,527	3,790,999	434,420	3,990,431	293,926	12,258	13,317
Aug.	4,529,291	186,097	165,891	3,722,094	455,209	4,013,552	354,067	15,926	10,325
Sept.	4,417,888	188,599	179,629	3,622,799	426,861	4,005,578	346,698	16,984	11,654
Oct.	4,937,436	212,237	248,643	3,979,437	497,119	4,518,770	367,063	16,186	11,307
Nov.	5,204,446	202,824	263,484	4,233,253	504,885	4,764,215	375,526	16,178	15,932
Dec.	5,526,720	229,717	259,423	4,510,772	526,808	4,978,200	403,726	19,829	13,917
Total	58,113,924	2,241,436	2,798,646	47,485,047	5,587,465	52,373,541	4,364,418	215,158	155,258
1955									
Jan.	5,729,404	243,608	272,451	4,703,875	509,470	5,202,360	409,281	18,874	20,016
Feb.	5,394,585	209,852	252,860	4,425,080	506,793	4,964,515	409,141	20,576	22,551
Mar.	6,406,902	221,437	359,413	5,239,116	586,936	5,830,943	480,639	24,066	15,931
Apr.	6,329,927	210,085	305,188	5,068,506	746,148	.....	.....	.....	.....
May	6,753,236	246,661	342,544	5,385,299	778,732	.....	.....	.....	.....
5 mo.	30,614,054	1,131,643	1,532,456	24,821,876	3,128,079	.....	.....	.....	.....

*Source: U. S. Dept. of Interior. Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only.

USITE



Typical Depression Cast Steel Riser



Typical Depression Steel Ingot

is an efficient insulator for maintaining the temperature of metal in hot tops, risers and transfer ladles.

When used "pound for pound" in comparison with other hot top insulators, it will give

GREATER YIELD WITHOUT CONTAMINATION at LESS COST.

HERE ARE THE REASONS WHY:

- **USITE** is a fine powder, and therefore spreads readily.
- **USITE** is free of graphite and other forms of carbon soluble in molten steel.
- **USITE** is chemically inert, and will not contaminate the melt.
- **USITE** does not affect the carbon content of the steel.
- **USITE** promotes the formation of flat shrinkage in the head.
- **USITE** keeps the metal fluid in the hot top or riser.
- **USITE** prevents the formation of secondary pipe.

Manufactured in the U.S. from domestic materials, USITE is shipped in non-returnable barrels containing approximately 500 lbs. Other USITE products are: USITE HOT TOP BLANKET, guaranteed free from graphite; USITE TYPE F-1, (EXOTHERMIC), for steel ingots, cast steel risers and gray iron risers. A test in your own plant will convince you of the superior qualities and economies of USITE. Our technical staff will be glad to answer any chemical or metallurgical questions involving our products.

Barium & Chemicals, Inc.

WILLOUGHBY, OHIO

For PACK HARDENING and BOX ANNEALING, use

ANNEEL-PAK

Guaranteed free of graphite, it flows like red hot rain at 2100°. Has a very fast rate of convection.

NO trapped air
NO voids or fuseing
NO gas, fumes or flame
NO recarburization
NO decarburization
NO adherence to parts
NO solidifying
NO gumminess, shrinkage

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MANUFACTURERS OF Metallic Manganese Sulphide; Barium, Strontium, Manganese and Calcium Products; Carbonate-oxide-hydrate-hydroxide-peroxide-chloride-chromate-sulphide-sulphate-oxalate-thiusulphate-fluoride-acetate-nitrate-hydrogen peroxide-anti-scumming dust-Barium "XA" and special formulas compounded to order.

Territorial distributors wanted in United States and Canada.

AROUND THE COUNTRY

Philadelphia
New York
Chicago
Los Angeles
Pittsburgh

Pittsburgh— Many small foundries followed the recent practice of closing completely for two weeks for summer vacations. This year vacation weeks centered around the first week in July, causing a slowdown in local activity late in June and early in July.

Busiest foundries were those serving the automotive trade. A Pittsburgh steel foundry is working at top capacity making cable clamps for bridges planned in this area and in New York. Foundries serving the steel industry were hard pressed to meet their demand, as steel operations neared 100 per cent of capacity.

Other foundries report the customary midsummer slowdown began in late second quarter. Demand for foundry equipment tapered off at the same time. A large producer of sand mixers said new orders declined after a strong April and May. Foundry vacation slowdowns gave several firms time to make needed repairs, strengthening demand for repair parts in June. Foundry suppliers, with modest order backlogs, can give prompt service to such requests.

Chicago— Early in July the price of pig iron advanced $2.50 a gross ton without eliciting surprise since there had been no price change in two years. The general comment was that the boost could have been more.

The $2.50 markup is less than 4.5 per cent. By comparison, steel prices were raised an average 5.8 per cent this year and 2.5 per cent last year. Meanwhile, pig iron prices had remained stationary since July 1, 1953, when an advance of $1.50 was imposed.

Pig iron producers undoubtedly are playing cautiously because of the competitive angle. Iron availability has been pretty good for the past year or more, and consumption by foundries hasn't been all that was desired.

Blast furnace operations have been very high this year. In the Chicago district for example, there have been several weeks in which 42 of the available 43 furnaces have been active. Not since March and April, 1953, has there been such performance. Because of increases in furnace capacity, this year's production is record-breaking.

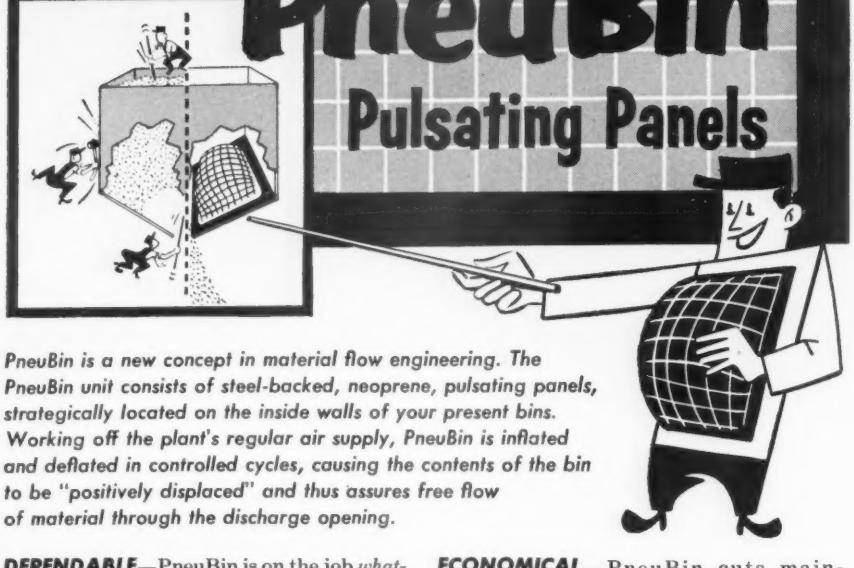
Bulk of the present iron output is going into steelmaking furnaces as hot metal. However, should the foundry demand for iron expand sufficiently, steelmakers probably would put more scrap into their open hearths and turn some of the blast furnace capacity to No. 2 foundry and malleable pig iron. It's all a matter of economics.

Foundry workers are turning on the "heat" as a bargaining point in new contracts. It has to do with the temperature at which it is too hot to work. A new agreement between

Assure constant material flow from your bins and hoppers with . . .

DEPENDABLE SAFE ECONOMICAL QUIET

PneuBin Pulsating Panels



PneuBin is a new concept in material flow engineering. The PneuBin unit consists of steel-backed, neoprene, pulsating panels, strategically located on the inside walls of your present bins. Working off the plant's regular air supply, PneuBin is inflated and deflated in controlled cycles, causing the contents of the bin to be "positively displaced" and thus assures free flow of material through the discharge opening.

DEPENDABLE—PneuBin is on the job *whatever* the material flow problem. PneuBin's principle of "positive displacement" moves the bin contents, not the bin . . . assures constant, free-running material discharge. *Depend on PneuBin to insure material flow.*

SAFE—No manpower is needed to facilitate material flow from bins when PneuBin is on the job. No more prodding, poling or sledge-hammering. *Depend on PneuBin to insure material flow . . . safely.*

ECONOMICAL—PneuBin cuts maintenance costs, saves money year after year. Reduce bin damage . . . increase bin life. *Depend on PneuBin to insure material flow . . . safely, economically.*

QUIET—PneuBin pulsating panels breathe . . . not snore. No hammering or loud vibration noises. PneuBin's quiet operation adds to overall plant efficiency . . . reduces employee fatigue. *Depend on PneuBin to insure material flow . . . safely, economically, quietly.*

Send for "Flow Stoppage" and free literature. PneuBin engineers will gladly make recommendations with no obligation on your part.

PneuBin

A PRODUCT OF
GEROTOR MAY CORPORATION
1533 Maryland Ave., Baltimore 3, Maryland

a Milwaukee malleable foundry and its union is reported to contain a contractual provision that an individual worker who feels it is too hot to work may notify the company of that fact between 8:30 and 8:45 a.m. and leave.

The agreement followed a shutdown of nearly three weeks in late June which started because the company discharged a majority of its workers after a number left their jobs complaining of the heat. The union claimed to have a verbal agreement that the foundry would be closed when the outdoor temperature reached 85°—a point reached on the afternoon of the walkout.

New York—Foundry operations declined in July because of vacation suspensions and hot weather, and there likely will be some lag in August for the same reasons. The dip last month was not as sharp as some expected, however, since demand for castings held up better than anticipated.

Gray iron shops are operating four to five days a week, with the white metal and brass and bronze shops doing a little better than that.

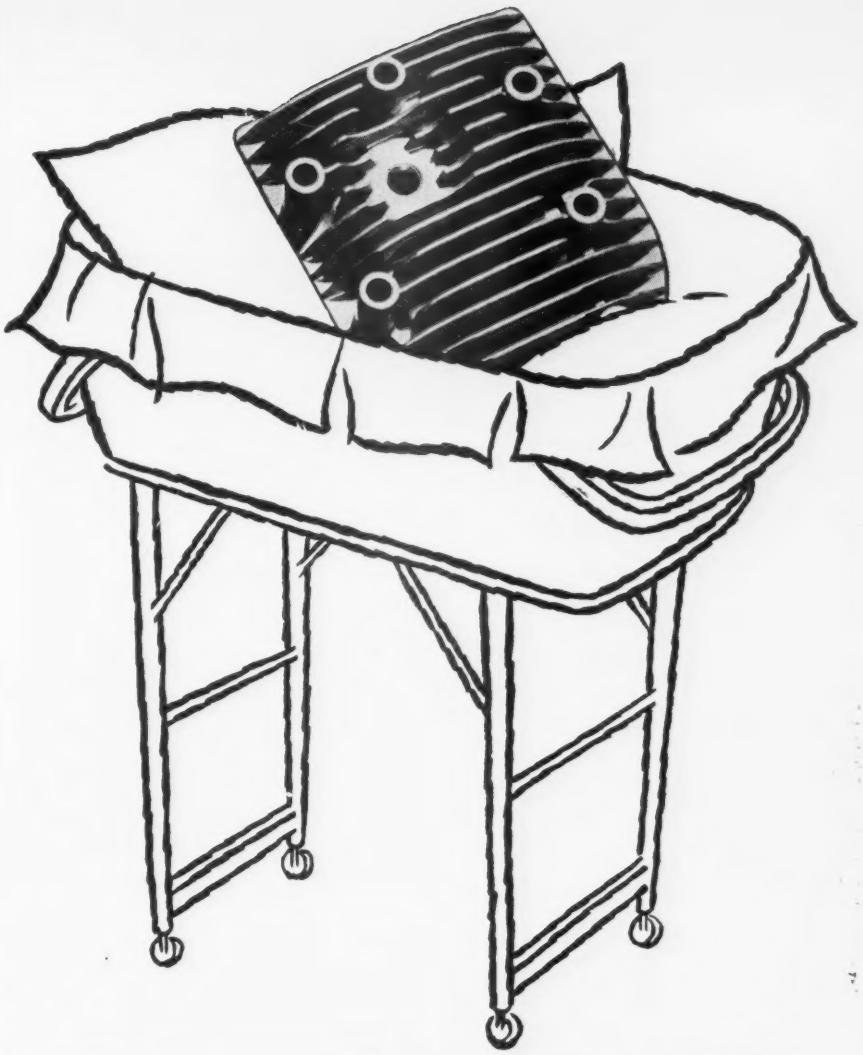
Activity in the building trade is reflected particularly in the business of gray iron and red metal foundries.

Pig iron prices have advanced $2.50 a ton. Strength also is being shown in scrap and other raw materials. Accordingly, the general level of casting prices is somewhat higher, although competition is keeping increases within bounds.

Los Angeles—Foundrymen are looking toward future months with optimism, although bookings from defense contracts have fallen slightly. In best shape are foundries with a large volume of commercial business. These shops report activity in excess of 100 per cent of capacity, and some are working overtime.

Foundries with a heavy proportion of defense business are off slightly from their excellent second quarter sales, but even these shops are optimistic about the future. Most of their troubles, they say, stem from the statement by Air Force Secretary Talbott that aircraft production should be centered at inland plants rather than the coast. Now that some of the furore has died down, most foundrymen feel aircraft plants will soon be humming again.

Just in case the Talbott statement proves to be something more than a sounding board, foundries are out looking for more commercial business. This is almost a 100 per cent



This casting took a lot of pre-natal care

The success of a casting is often determined long before the metal is melted and the casting poured, because no matter how carefully casting is done nor how excellent the mold, a quality part cannot result unless quality metal is used.

Foundries and die-casters need ingots that will be alike in quality and characteristics from lot to lot, especially when castings of intricate character must be precisely cast in quantities. To assure such results, the Federated Metals Division of American Smelting and Refining Company employs the most modern quality control methods. Electronic testing devices and expert metallurgists check each heat poured from Federated's furnaces.

Both supporting and preceding quality control is Federated's modern Central Research Laboratory, which has developed alloys such as Castomatic® type metals and solders and Tenzaloy, the high strength aluminum alloy that ages without heat treatment.

Whatever you need in non-ferrous ingot metal, or in technical service to assure good non-ferrous castings, think of Federated first as your source of supply and technical information. Our broad experience with all kinds of non-ferrous metals has earned us our reputation as Headquarters for Non-Ferrous Metals.

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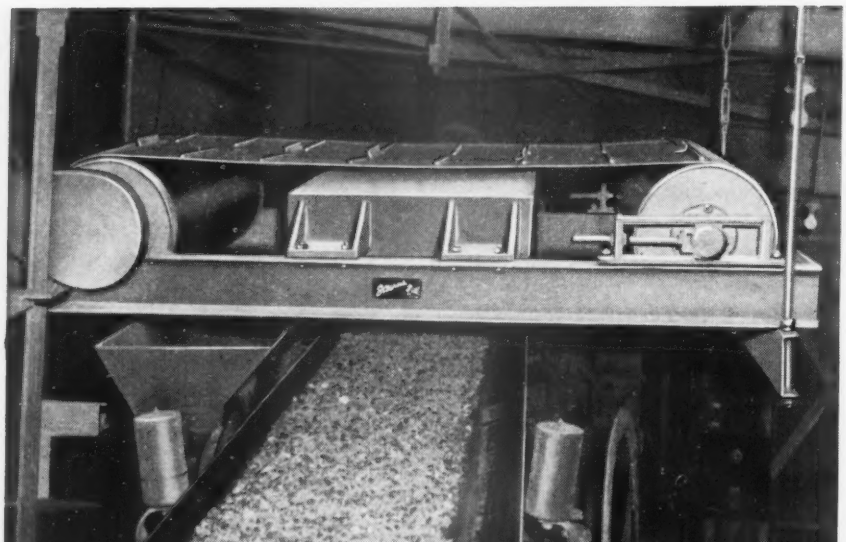
Federated first in the non-ferrous field — AMD

Aluminum, Anodes, Babbitts, Brass, Bronze, Die Casting Metals, Lead, Lead Products, Magnesium, Solders, Type Metals, Zinc Dust

Pulls tramp iron out and whisks it away . . . automatically



Here a Stearns cross-belt separator removes tramp iron from foundry sand.

Install this new Stearns cross-belt magnetic separator over a sand conveyor line and clean out tramp iron continuously, automatically. Powerful magnet pulls out sprues, fins, gaggers, etc. which are carried away from the magnet face by a cleated, self-cleaning endless belt.

No delay

Because magnet never requires cleaning, there's no need to stop conveyor. Also, there's no danger of tramp iron ever dropping back into sand.

Guaranteed for life

The powerful, non-electric Stearns magnet is made of highest grade Alnico V steel and guaranteed permanently magnetic for the life of the installation. Its deep-reaching field penetrates material to remove embedded tramp iron.

Complete — as illustrated

The cross-belt magnet is shipped fully assembled, ready to install. Eighteen models to fit conveyor belts ranging from 20 to 48 in. wide. Custom-built models on request. Purify sand, protect equipment with this modern, fully automatic separator. Write for bulletin 88 or see your Stearns representative.

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MAGNETIC EQUIPMENT FOR ALL INDUSTRY

STEARNS MAGNETS

STEARNS MAGNETIC, INC., 662 S. 28th St., Milwaukee 46, Wis.

switch from two years ago, when commercial business had fallen off to almost nothing, and most foundries then were surviving only because of heavy defense contracts.

Supply of foundry materials is good. Coke is particularly plentiful. Deliveries of pig iron are regular, with all district mills allocating pig iron to foundries. A slowdown of pipe foundries with a consequent lessening of their scrap needs has made more scrap available for other foundry use.

Volume-wise, sales for most steel foundries in the second half exceeded both the first half this year and the second half of 1954 by more than 15 per cent. Inquiries from commercial casting consumers are high, forming a basis for the prevailing optimism among foundrymen serving commercial accounts.

Philadelphia— Despite adverse seasonal influences, foundry business is holding up relatively well. In general, business is good, although not on a parity with June, which represented the peak for most shops in this area for the year to date.

Where not disrupted by their own vacation schedules, gray iron shops are operating five days a week. In most instances, this weekly schedule reflects full operating crews, not limited working forces, as it has much of the time this year. Backlogs are slightly less extended, partly because more nearly full working forces are being employed.

Steel foundries also are operating at a good clip, considering the season of the year. Backlogs are not quite as extended as they were a month ago, but are heavier than they were two or three months ago. Utilization of full working forces again supplies part of the answer. Demand is diversified.

Malleable shops are about holding their own, with depressing seasonal influences offset by a strong demand for pipe fittings and improved specifications from the railroads. In line with other important divisions of the foundry industry, malleable shops here are operating around five days a week, with full working forces. Backlogs average around five weeks.

Nonferrous foundries are doing quite well. Brass and bronze shops, operating five days a week, are able to at least sustain backlogs of three to four weeks. The white metal foundries are averaging better, six to seven weeks. Aluminum shops engaged in aircraft work have an even more extended order book.

The iron shop of Baldwin-Lima-Hamilton Corp., Eddystone, Pa., was shut down permanently around the

middle of July. Company officials say the action was caused by lack of demand for large castings. About 100 employees were affected. The company's nonferrous foundry at Eddystone will continue in operation.

Foundry Accident Rate Shows Decline in 1954

Safety Record Improves 60 Per Cent Since 1948

FOUNDRY MEMBERS of the National Safety Council improved their safety record further last year. The frequency with which accidents happened in those plants during 1954 declined for the third consecutive year and was 60 per cent less than in 1948. Severity of the accidents has dropped 50 per cent in seven years.

The average frequency rate for employees in all industries submitting company reports to the National Safety Council was 7.22 accidents per 1,000,000 man-hours in 1954. The rate for foundries was 8.81. The average accident severity rate for all industries, based on the number of days lost per 1000 man-hours, was 0.80. This compares with 0.87 for foundries.

Progress that foundries have made in improving their safety records the last seven years is shown in the following annual frequency and severity rates:

Year	Frequency	Severity
1954	8.81	0.87
1953	10.94	1.05
1952	13.93	1.05
1951	16.21	1.29
1950	13.20	1.40
1949	13.87	1.43
1948	21.06	1.74

In 1940, of 39 different industries only woodworking, marine transport, mining and lumber had a worse safety record than the foundry industry. Last year, foundries had a lower accident rate than did 14 other industries. In fact, last year a foundryman was safer on the job than was an employee in such seemingly nonhazardous industries as meat packing, food or the service industry.

It should be pointed out that these data are not representative for the entire foundry industry. They apply only to foundries which are members of the National Safety Council—companies which are more than casually interested in their safety records and are doing something about it. In the past the accident frequency rate for the foundry industry as a whole has been about double that of the council members.

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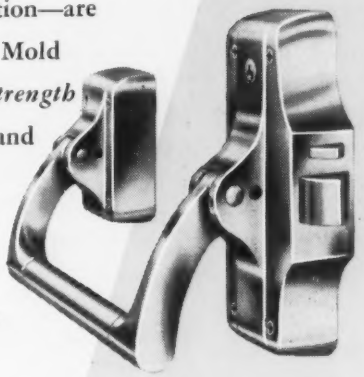
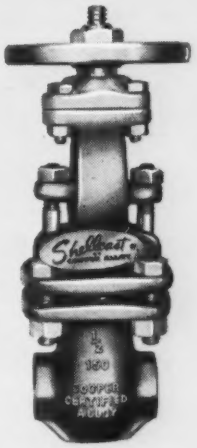


Moreover, their *superior tensile and transverse strengths* produce strong, uniform shells, while the *excellent hot rigidity* characteristics of these Resins insure straight, rigid shells.



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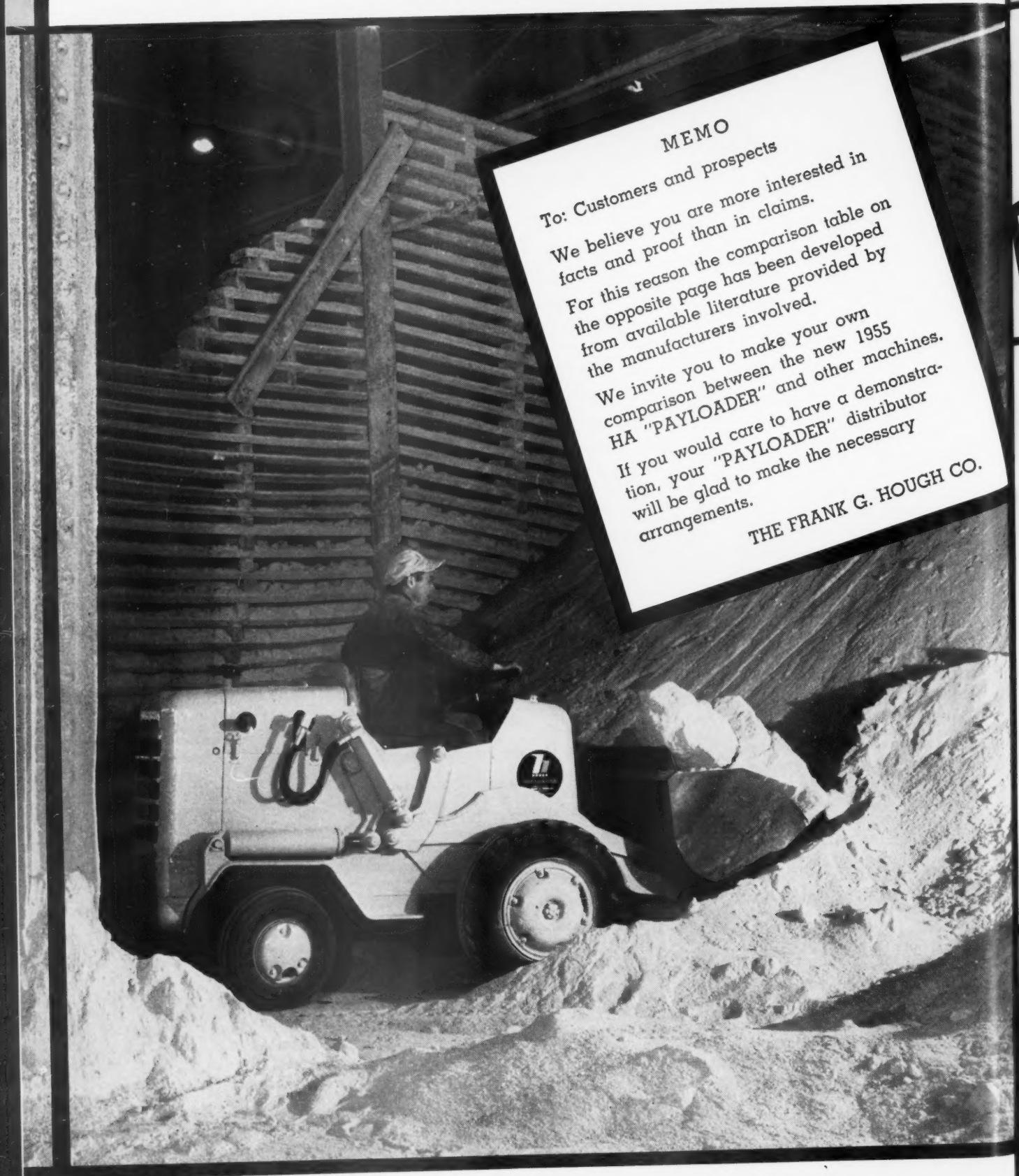

MEMO

To: Customers and prospects

We believe you are more interested in facts and proof than in claims.

For this reason the comparison table on the opposite page has been developed from available literature provided by the manufacturers involved.

We invite you to make your own comparison between the new 1955 HA "PAYLOADER" and other machines.

If you would care to have a demonstration, your "PAYLOADER" distributor will be glad to make the necessary arrangements.

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	1955 HA model	Machine A	Machine B	Machine C	Machine D	Machine E	Machine F
HEAPED CAPACITY CU. FT.	18	X	X	X	X	X	X
STRUCK CAPACITY CU. FT.	14	12	12	12	12	13.5	11
LIFT CAPACITY O MPH LBS.	3000	1000	1200	1250	1500	3000	1200
BREAKOUT FORCE LBS.	3100	X	X	X	X	X	X
ANGLE BREAKOUT GROUND LEVEL °	40°	NONE	NONE	NONE	NONE	22°	NONE
MAX. DUMPING HEIGHT FT. IN.	5'-2½"	4'-3"	4'-6"	6'-2½"	5'-4"	4'-5"	5'-0"
TURNING RADIUS OUTSIDE CORNER BUCKET FT. IN.	6'-3½"	6'-11"	6'-6"	5'-1"	7'-6"	6'-6"	5'-11½"
TURNING RADIUS OUTSIDE REAR HUB FT. IN.	6'-2"	6'-8"	X	6'-8"	X	6'-4"	X
TORQUE CONVERTER	YES	EXTRA	NO	NO	NO	YES	NO
AVERAGE WEIGHT LBS.	4980	5000	4875	5250	6000	6000	4400
GAS-POWERED MODEL	YES	YES	YES	YES	YES	YES	YES
DIESEL-POWERED MODEL	YES	YES	NO	NO	NO	NO	NO

X — indicates NOT KNOWN

The 1955 HA PAYLOADER has more productive capacity than any other unit in this size range!

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Trouble Shooting

By C. W. AMMEN

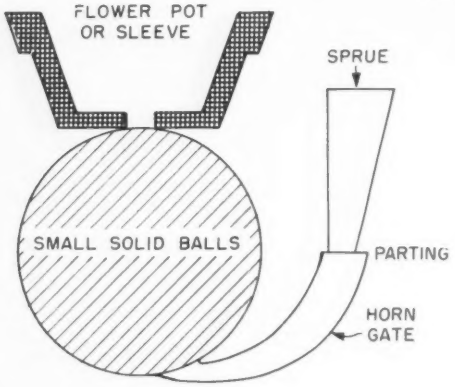

Fig. 1 (below) — View shows alternate ways to pour small balls—either through the top through a small gate with a flower pot in the cope, with necked-down core, or through a horngate at bottom

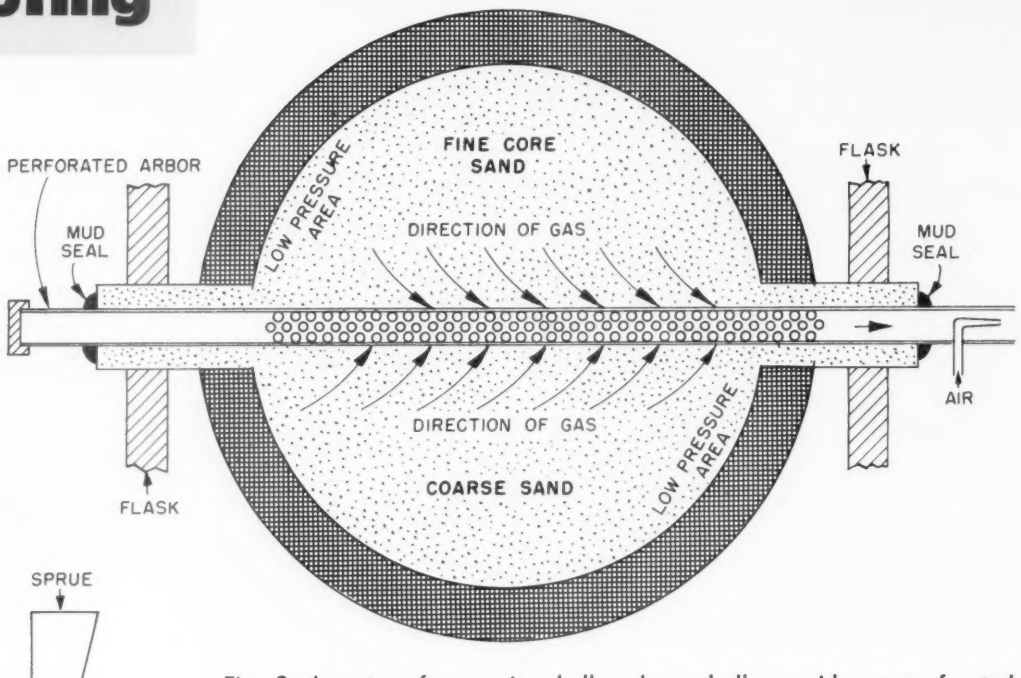

Fig. 2—A system for pouring hollow brass balls provides a perforated arbor through the center of the core and the center of the core prints. Core gas is sucked to the center of the core and out through the print

Casting Hollow Balls

DEAR CHARLIE:

Have been producing various and sundry iron and brass castings for local sugar refineries in this area. These refineries do not supply me with a great deal of tonnage, but their work is steady, year in and year out, and contributes enough to my total yearly tonnage that I wish to keep these customers in my good graces.

Up to this point I have had little or no trouble satisfying the refineries with the castings I have produced for them. Last month I received an invitation to bid on six cast brass hollow balls. These balls are 12 in. OD and 10-¾ in. ID. The core is supported by a 2-in. print extending through each end of the ball at the parting line. Along with the 12-in. hollow balls were six, 6-in. solid balls. In our opinion the solid bronze balls represented a problem as far as feed and gating were concerned, but we felt that the 12-in. hollow balls would be a simple matter. Metal specification was 88-10-2.

These balls were to be machined by the refinery all over to a mirror finish and were going into service in some sort of a ball check in a molasses line in the refinery. The refineries have been buying these cast balls from a ball manufacturer somewhere in the northeast section of the country, but could see no reason why they could not be manufactured locally. We were the successful bidder and got the big rosy job of producing the first set to be made in this area. We were successful in the bid, but extremely unsuccessful in casting the balls. The core in the 12-in. ball blew so badly in the cope half that when machined the metal was full of holes; in some cases the ball machined through in spots, scrapping them out.

The refinery, needless to say, is indeed unhappy since the machining is not only complicated, but costly. The holes through the end of the ball which contained the core print are plugged up, and the ball is machined on a specially designed ball lathe. The small balls came out egg-shaped, not round—short in the diameter from the cope to the drag, at right angles to the parting line. No amount of riser or anything else has seemed to help us here. On the large ball, we have run the gamut of core mixes and have hollowed out the core and stuffed it with small coke and what have you. We still are unable to get the large volume of gas produced by the core through the small, 2-in. prints, and there we hang.

Sincerely,
SAM

DEAR SAM:

The mere mention of casting bronze balls, or any other kind, large or small diameter, brings to mind an extremely sad experience yours truly had in casting sixteen, 20-in. bronze balls with a 4-in. hole through them. These balls went into some sort of a big ball-hinge for an extremely large set of locks. We finally whipped the job, but long after the profit had been shot. In a jobbing foundry, you are in a position unlike that of a production shop, which has thousands of an item to make and sufficient time to work out the troubles and then come out on the big end. At most you have one or two shots at a job, and from then on you are working for the love of it.

The core blow on your large ball usually is formed before the metal solidifies because of greater gas pressure within the core section than on the outside of the core. The outside pressure is equal to the ferrostatic pressure of the layer of metal

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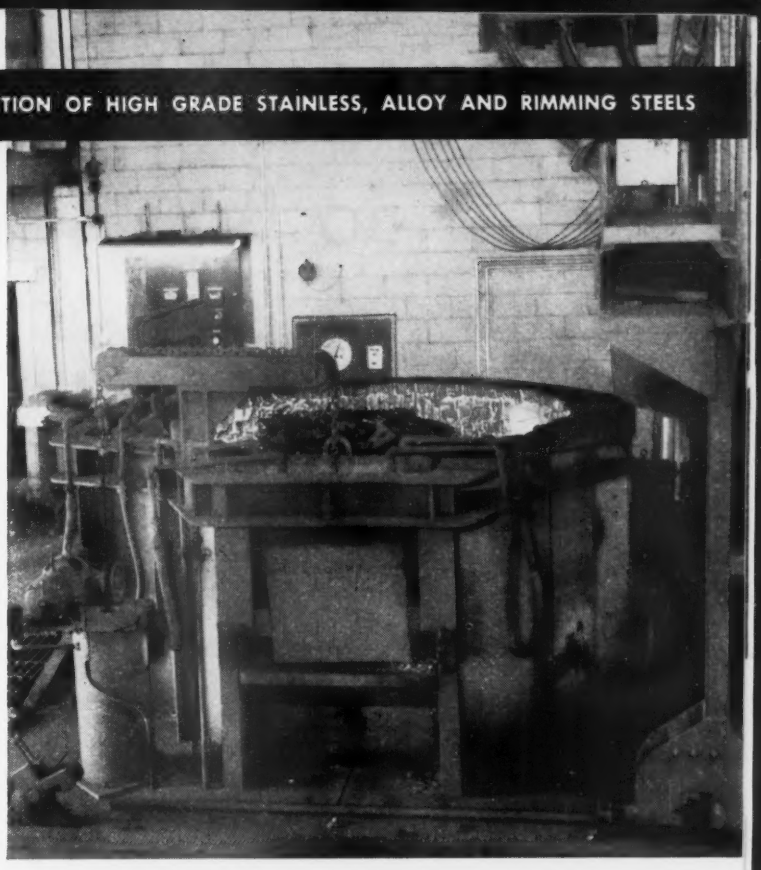

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To keep pace with your fast-moving industry . . . to produce better quality castings . . . faster, and more economically, it will pay you to consider the addition of electric furnaces to your existing metal-melting facilities.

In the light of the experience of some of the nation's leading foundries, Heroult Electric Melting Furnaces should easily prove a big time and labor saver, *and quality up-grader* for you.

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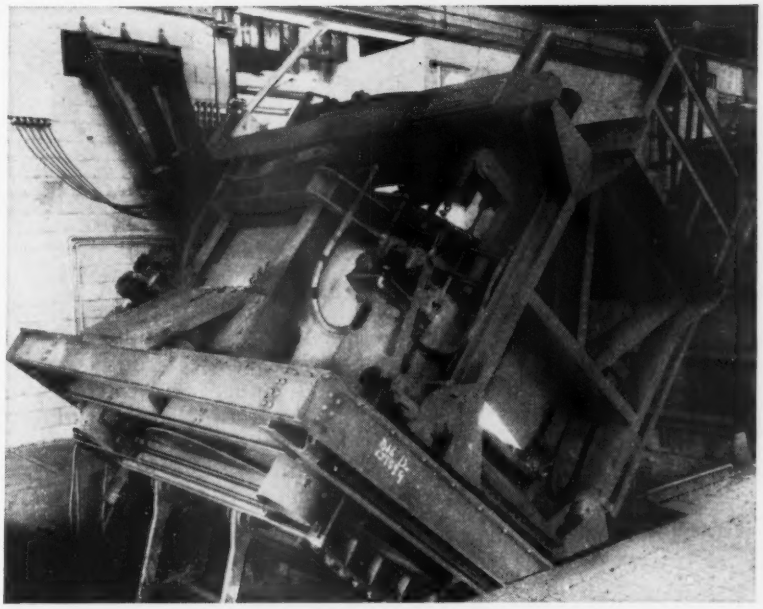

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HEADQUARTERS FOR SCALES

laying on the core at any particular section and the gas pressure at the mold surface. In this case you have only ⅝ in. of brass around a 10¾-in. diam core.

Most blows from cores are caused by insufficient venting of the core within the core itself or by vents through the mold to the atmosphere. We assume that the core for the large ball has been made properly, has sufficient permeability, is not underbaked and does not produce an excessive amount of gas because too much binder is used. The problem reduces somewhat to getting a comparatively large volume of gas out of the core in relation to the small core print or area through which this gas has to pass.

We have a gas volume-pressure-time problem. Were we able to control the time at which the binders in the core start to generate any amount of gas as to volume and pressure, the problem would be simple; however, such control is not easy. I have seen many castings with a thin-walled section containing large cores with small outlets through the prints cause what often is misconstrued as a misrun. The trouble actually is gas pressure holding the metal back, even with some of the binders which produce a low volume of gas.

Some binders, it is true, give off a small amount of gas. Even though the amount of this gas may be small, if it is given off too soon, while the thin section of the casting is in a liquid state, the damage has been done. This is true even though little or no other gas is generated, for the defect already exists.

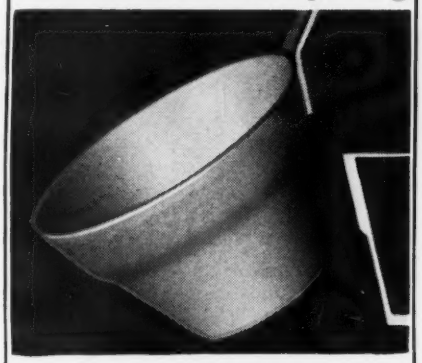
No single type of binder is suitable for all types of castings. As in the case of the ball, even an old-type, sticky, high-gas-generator binder might do the trick if it takes long enough before it starts its gas generation to give the metal time to set and to offer enough resistance to the gas to force it through the core prints.

The safest system I ever saw is shown in Fig. 2. This system provides a perforated arbor through the center of the core and the center of the core prints. Core gas actually is sucked to the center of the core and out through the print. This action causes a partial vacuum at the area closest to the surface of the core, reducing the pressure at that point below that of the ferrostatic pressure of the thin body of metal resting on the core.

This step can be accomplished in two ways. One end of the arbor can be hooked up to a suction pump or a blower with sufficient suction to direct the core gas to the holes in the arbor and vents. Alternatively,

NEW LADLES

for non-ferrous metal pouring



• New Spincraft ladle design offers you reinforced cup bottoms and pouring edges of heavier gauge with the weight-saving side walls.

You get improved heat transfer . . . new lighter weight and better balance for "swinging" faster, safer and easier between crucible and mold or machine.

NEW LOW PRICES

Now in 23 sizes

¼ to 30-lb. capacity

(in molten aluminum)

• Spincraft ladles actually cost you *less* to use. Prices are lower than ever before. There are new sizes that are *right* for your needs. Deep conical form makes wasteful spilling almost impossible. Handles are "whack-proof." Your choice of stainless steel or mild steel cups. Ladle cups may be purchased separately.

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• You'll never know how good Spincraft ladles really are unless you try 'em in your plant, under your conditions. We're sure they'll *exceed* your expectations in reduced operator fatigue — in much longer ladle life. Write for prices. Complete data on non-standard sizes, gauges, materials quoted on request.

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INCORPORATED

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as illustrated, an air jet in the arbor, blowing outward, builds up a partial vacuum behind the jet and causes the core gas to follow the path of the partial vacuum. I saw some bronze rolls which had to be polished and engraved whipped this way. They contained cores, to hollow them out, which went through a comparatively small print on the ends of the rolls.

In the first attempt, an air hose was attached to the end of the arbor. Air was blown through the arbor and out the opposite end in an attempt to attract the core gas into the arbor and out, following the stream of air. This attempt did not, however, prove as successful as setting up a partial vacuum by sucking on the arbor or by an air jet in the arbor blowing outward.

The air jet is started the moment the pouring commences. The end of the arbor must be ignited immediately. Make certain that no one stands in the front of it. The arbor passes completely through the flask, and if enough gas is generated and enough air supplied, a long, rocket-type flame comes out the end of the arm arbor. The latter can be imbedded in the core when it is made up, but it is preferable to make a hole slightly larger than the arbor itself through the core. It represents the core vent.

After the whole job has been put up, the arbor is slipped through the hole, and each end of the core is mudded up around the arbor to form a seal. This procedure reduces the possibility of stopping up the holes in the arbor or getting the arbor full of sand and stopping the action from that angle. This system is not 100 per cent effective, but it's close to it. I have used it personally on many jobs, with 100 per cent results.

Small balls, particularly the solid ones, often emerge egg-shaped, short from cope to drag. I have seen these little rascals, from 6 to 12 and 14 in. in diam, lagged ½ in. at the parting straight up, to take up for this mashing effect or squatting down of the ball. This procedure might not solve your problem, however. These small balls can be poured right through the top, through a small gate with a flower pot or an insulated sleeve in the cope, with a necked-down core. If you prefer, you can horngate into the bottom of the ball, stop off the sprue when metal shows in the riser, then hot top and cover with vermiculite or an exothermic compound of some sort to keep your riser liquid and feed the ball.

Trust this is of some help to you, Sam.

Sincerely,

CHARLIE

BLASTRITE

SHOT and GRIT

A complete range of sizes, standard or made-to-order.

CHILLED CAST IRON SHOT & GRIT

For tough cleaning jobs or surface finishing of heat-treated parts.

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Hi-strength reduces fracturing due to impact.

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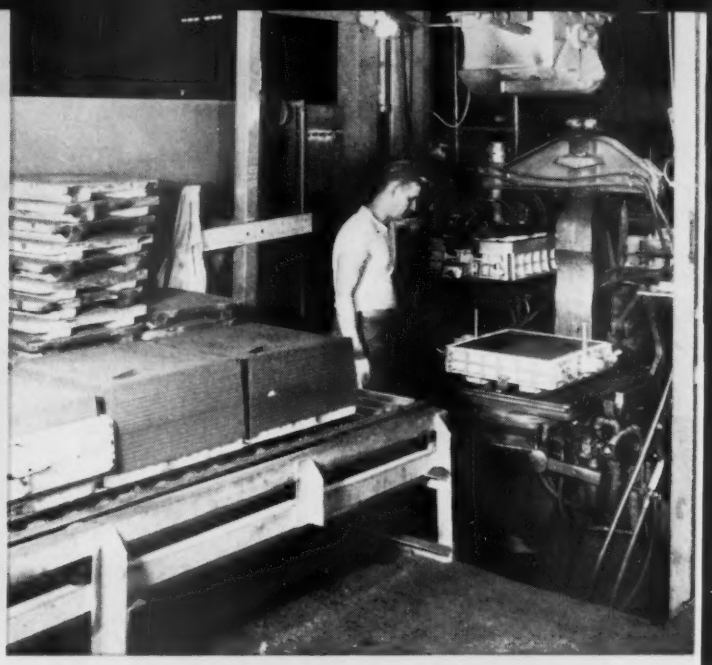
ONE MAN...
ONE OSBORN ROTA-LIFT
turn out twice as many molds per manhour

New high quality . . . new low cost *on these pipe couplings for high pressure service. Castings are of uniform size . . . uniform quality. Production is consistent throughout the day.*

Fills Drag—Rota-Lift will jolt the drag, then pick up the flask on split trunnions enabling the operator to roll-over the flask.



Opens Mold after cope has been squeezed and drawn by Rota-Lift. The pattern is then removed from the drag.

ROTA-LIFT...the molder's helper

- ***ELIMINATES HEAVY MANUAL LIFTING***
- ***SIMPLIFIES MOLD PRODUCTION***
- ***IMPROVES FOUNDRY EFFICIENCY***

HERE'S a picture of one man—one Osborn Rota-Lift turning out 160 top-quality molds daily. It used to take two operators. Molds are uniform in density . . . have high dimensional accuracy for pressure-tight joint castings.

Cost per mold is less than heretofore possible.

It's easier to maintain uniform foundry schedules day in and day out with Osborn Rota-Lift. That's because Rota-Lift mechanically handles the mold . . . reduces heavy lifting and operator fatigue that used to limit the size of match-plate patterns.

How much can Rota-Lift cut your costs? Have an Osborn foundry specialist look over your work . . . show you how to simplify molding . . . eliminate costly operations. Write The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland 14, Ohio.

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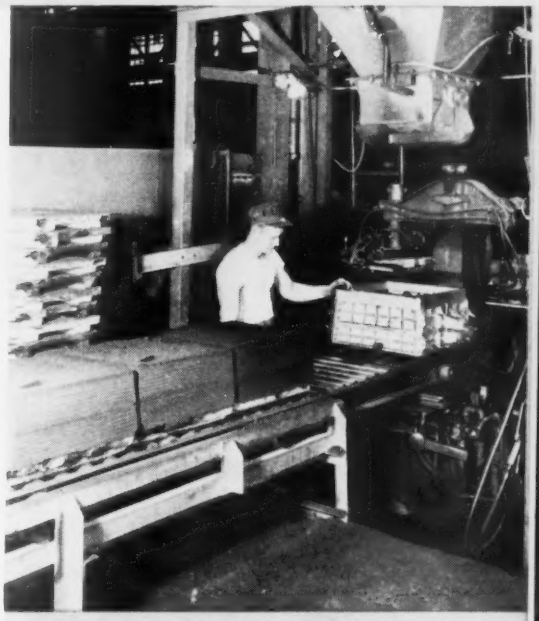

Rolls Away the finished mold, after the Rota-Lift has closed the mold and suspended it for easy positioning of conveyor.

Removes Flask from the finished mold before returning to the Rota-Lift for the next mold.

ACTIVITIES of Foundry Groups

Southern California: About 100 members of the AFS chapter attended the June 10 Past Presidents' and Officers' Night meeting at Rodger Young Auditorium, Los Angeles. Charles Gregg, Gregg Iron Foundry, chairman, reviewed some of the highlights and accomplishments of the past year. He presented the gavel to William Baud, Mechanical Foundries Division, Food Machinery Corp., incoming chairman for 1955-56. Each past president in attendance was recognized by the members in appreciation of his past service to the chapter.

Dr. Jose Traigo was the speaker for the meeting and he kept the members in constant laughter with his humorous wit. Annual summer picnic and outing will be held Aug. 13 at Lakewood Country Club.—*W. G. Stenberg, U. S. Electrical Motors Inc.*

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Eastern N. Y.: An off-the-cuff talk on sand control and testing by Cliff Apgar, works manager, Adirondack Foundries & Steel Inc., Watervliet, N. Y., was the feature of the May 17 meeting. Relating some of his experiences with sand control in iron, steel and nonferrous foundries over the past 30 years, Mr. Apgar said one of the big problems is that often when one defect is eliminated by controlling one variable in the sand mix, another defect is introduced. Therefore, properties of mold and core mixes must be carefully balanced.—*L. J. DiNuzzo, General Electric Co.*

Cleveland Nonferrous: Ridgewood Country Club, Cleveland, was the scene of the NFFS chapter's annual golf outing on June 29. Following dinner, golf prizes were awarded as well as door prizes to all who attended. Officers elected for 1955-56 are Walter O. Larson Jr., Grafton Foundry Co., chairman; A. E. Schauer, Schauer Brass & Aluminum Co., vice chairman; D. B. Kennedy, Gluntz Brass & Aluminum Co., treasurer, and W. O'Malley, Wellman Bronze & Aluminum Co., secretary.—*Walter O. Larson Jr., Grafton Foundry Co.*

Washington: About 65 members and guests of the AFS chapter enjoyed a dinner-dance at the Bremerton Elks Club, Bremerton, Wash., in June. James N. Wessel, Puget Sound Naval Shipyard, served as toastmaster and introduced officers for 1955-56. Leon Morrell, apprentice contest chairman, awarded prizes to the chapter contest winners.—*E. F. Riedle, Puget Sound Naval Shipyard.*

Northeastern Ohio: More than 300 members of the AFS chapter gathered at Twin Lakes Country Club, near Kent, O., on June 25 for their annual picnic and golf outing. Golf, horseshoes, and softball preceded the customary steak dinner. The annual grudge battle between the vendors

and foundrymen was won by the foundrymen, 22-6. Several dozen valuable door prizes were awarded lucky number ticket holders.—*Kenneth L. Mountain.*

Western Michigan: About 125 persons attended the May 2 meeting of the AFS chapter at Bill Stern's, Muskegon Heights, Mich. Speaker for the meeting was Victor M. Rowell, executive vice president, Harry W. Dietert Co., who discussed "Sand Practice." Mr. Rowell elaborated on various sand properties beginning

WESTERN MICHIGAN: George Bartlett, left, Neway Equipment Co., chairman-elect for 1955-56, receives gavel from John A. VanHaver, retiring chairman, Sealed Power Corp., at the May 2 meeting of the AFS chapter. Photograph by courtesy W. W. Hicks, Sealed Power Corp.

with base sand through green, dry and elevated temperatures through the shakeout, and correlated these various properties with end casting quality. Both core and molding sands were covered.

Newly elected officers for 1955-56 are George Bartlett, Neway Equipment Co., chairman; Henry Laforet, Lakey Foundry Corp., vice chairman; David Jacobson, Grand Haven Brass Foundry, treasurer, and Charles Cousineau, Carpenter Bros., secretary. Retiring chairman is John A. Van Haver, Sealed Power Corp.—*Wilson W. Hicks, Sealed Power Corp.*

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Now you can mechanize your bulk handling operations for less than $10.00 per day for one year . . . much less than you pay a laborer with a hand shovel!

This rugged Model 20 SHOVELOADER has a lifting capacity of 1500 pounds, and lifting height of 7 feet. Standard bucket size is 12 cubic feet. Loader arms are in *front* of operator—not around him—protecting him from injury and providing full 360° visibility at all times.

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Bucket tilt-back at ground level means a full load at every grab, and permits low carrying position for travel. Other advantages are longer forward reach, greater longitudinal stability, extremely low maintenance because of easy accessibility of all parts requiring service, and design of the husky, trial-proven engine.

Special attachments are available for special jobs—forks for palletized loads, crane hooks for hoisting, and special buckets for dense materials. Catalytic exhaust system is available for inside work, where required.

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HANDLING EQUIPMENT

5582

Too Many Barefoot Boys In Our Foundries

Well Dressed Foundrymen Always Wear Safety Shoes

By Lawrence Kaelin*

THE PRESIDENT of the United States last May told his Conference on Occupational Safety that he was appalled by the industrial accident problem. He threw the challenge to "stop accidents among our people." I believe he was looking those of us in the foundry business right in the eye when he spoke.

Management in the foundry industry can truthfully say that it has used every vehicle at its disposal to drop the accident toll. Most managers have as much pride in a nonaccident month as they have in an unusually high sales month. (The manager at the plant where I work not only backs his safety director 100 per cent. He himself wears safety shoes at the plant.)

The foundry engineer can show that he too has contributed to reducing accidents. The engineer has made our tools and machinery "foolproof" and "darned fool proof." He has taken a great load off many foundry workmen's backs by improving methods. He has reduced the number one cause of accidents—fatigue.

But too many accidents are still busting through for a score.

The foreman knows why they call him "foreman." He has "Four" man-sized jobs to do in performing his duties properly: Control of quality, control of production, departmental good housekeeping and selling safety to the workmen in his group. The four-man knows that *safety is no accident.* It is a habit.

The safety director applies the latest methods and developments to prevent accidents. He insists that workmen wear protective equipment where needed. His trained and observant eye seeks out even the remotest hazards and follows through to see that they are corrected.

The plant safety committee helps make accident preventers out of many foundry workmen. Once he has been on the safety committee, a man takes a new slant at accident prevention.

But too many good workmen are still being injured.

The National Safety Council knows it is possible to have freedom from accidents in a foundry. One large foundry in Cleveland just operated 1-million man-hours without a lost-time accident and received a Safety Council award. But malleable and gray iron foundry employees in 1953

had over five times as many accidents as blast furnace and steel mill workers. The United States Dept. of Labor says in its latest report that iron foundries have the highest number of lost-time accidents of any of the nine primary metal industries.

Let's take a bow, foundrymen. We had only 35 per cent as many accidents as America's most dangerous industry, the logging industry. Let's try to get down to the level of America's safest industry, synthetic fibres, which had only 5 per cent as many accidents as we had in foundries.

Foundry neighbors know that foundries pay good wages and that foundries have good racial relations —none better. They know that foundries have become civic conscious with their dust and smoke control programs. They agree that useful products are made in our iron foundries and that we are high priority in defense work. Foundry neighbors saw our Army-Navy "E" awards flying proudly under America's colors.

But they've heard about our casualty rates, too.

At the Indiana Industrial Safety Exhibition in Indianapolis last spring, a representative of the National Safety Council gave an impressive safety talk. In it he stated, "If I were a Soviet spy in the United States, I would gather the figures on the number of industrial casualties in our country and send them to the Iron Curtain countries, where they would be published with glee." If we in America have such a bad record for industrial accidents, the Soviet rate would probably double ours, if they ever worried enough to count their casualties. With their "Nobody's important" philosophy, they must have a terrific loss in their industries.

But that doesn't excuse us in America.

Although we workmen in foundries put out as good a day's work as any men in America, we've got to take accident prevention more seriously. True, we can't wrap ourselves in cotton, and don't want to: There's an element of risk in anything, any job. But let's leave the "boy" in us at home when we come to work. Foundry work is a man's business, calling for more horse sense and less horseplay. The safest men in our foundries now are our four-fingered men; they don't come back for second helpings. But why do we have to get burned first?

We should no more come to work in a foundry without safety shoes than we should come to work barefooted. If safety were sold by the foot, would you buy any? Probably not: Less than half the foundrymen wear safety shoes. Safety shoes are more comfortable now, so sporty they can be worn for dress and then worked down into the plant. *At twenty-five cents a foot, foundrymen can't afford* not *to wear steel-toed shoes.* That's how much more per shoe the retail price of one brand of safety shoe is than the cost of a

"Doc says my back needs some heat treatment."

Cut foundry operating costs . . .

Transite Core Plates are strong and durable . . . resist warpage, impact and abuse, provide long service life.

with Transite Core Plates and Slip Jackets

"Johns-Manville Transite* Core Plates help assure maximum production in minimum time"—that's the experience of foundrymen who have used them for years. Made of asbestos and cement, they are light in weight, yet strong and durable. Being non-metallic, they resist corrosion, maintain their smooth surface and can be easily cleaned.

Transite Slip Jackets are a companion product with similar advantages. They do not burn, retain their original shape despite runouts. Slip jackets are furnished in both white and black types. The latter is widely used as a protective liner for metallic slip jackets.

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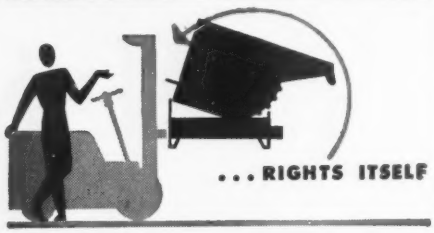
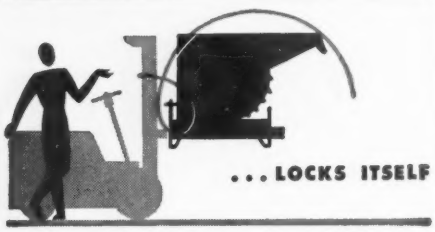
New Folder
gives complete details on Transite Core Plates and Slip Jackets—as well as Transite Pallite products for dielectric furnaces. For your copy of folder PP-31A, write Johns-Manville, Box 60, New York 16; in Canada, 565 Lakeshore Road East, Port Credit, Ontario.

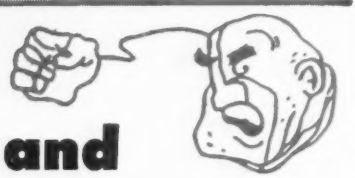
Transite Slip Jackets cost less than other types . . . last longer, too. Result—important savings for foundries.

*Reg. U. S. Pat. Off.

JM PRODUCTS **Johns-Manville TRANSITE** CORE PLATES AND SLIP JACKETS







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1417 Woodland Ave., Detroit 11, Michigan

standard type of dress shoe commonly available.

Workers in the Charleston Powder Factory here in Indiana are not allowed to wear metal in their clothing. They *don't*. And they don't have accidents . . . in a gunpowder plant. Isn't it time for us foundrymen to come to the conclusion that we too have a hazardous condition in our plants and to dress and act accordingly?

The *Monthly Labor Review* shows that most of the men in foundries now have the good sense to wear safety spectacles; only five eyes were lost in 1952. But four times that many lost toes. A happy fact is that most toe injuries merely split 'em; we lose only a small per cent of those damaged. What travels the faster, a jet plane or the speed of pain from bottom to top when a casting hits a toe?

Safety shoes are just an inch ahead in price, but two feet ahead in safety.

*This article won third prize in the 1954 safety letter contest conducted by the Malleable Founders' Society. Mr. Kaelin is melting foreman at the Indianapolis Works of National Malleable & Steel Castings Co. He was graduated from Arsenal Technical High School and has been at National Malleable since 1936. He won first prize in the 1953 contest.

How To Combat Corrosion

The Corrosion Research Council of the Engineering Foundation, 29 West 39th St., New York 18, has been formed to study causes of metallic corrosion and methods of correcting it. The group has been formed with the aid of the American Institute of Mining and Metallurgical Engineers, the Intersociety Corrosion Committee and the Electrochemical Society.

Book Review

Protective Coatings for Metals, by R. M. Burns and W. W. Bradley, cloth, 6 x 9 in., published by Reinhold Publishing Corp., 430 Park Ave., New York 22. Price $12.

Written for corrosion engineers, metallurgists, chemists and others concerned with the technology of corrosion control, this enlarged and rewritten second edition incorporates recent information available on the composition, properties and performance of both metallic and organic coatings.

Expanded sections evaluate organic coatings, and there are chapters on corrosion inhibitors, chemical conversion coatings and sprayed metal coatings. Explanations are offered for the phenomena of "silver migration" and "metallic whiskers." Latest practices in metal cleaning, coating application and testing also are included.

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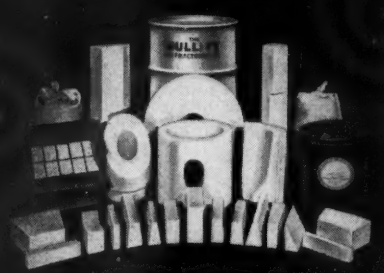

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Obituary

HERBERT L. EDINGER, 61, president, Barnett Foundry & Machine Co., Irvington, N. J., died June 26. He joined the company in 1909, when it was located in Newark, N. J., and served in all departments, becoming sales manager in 1928. He was elected vice president in 1931 and president in 1944. Mr. Edinger played a prominent part in association work. He was president of the Gray Iron Founders' Society in 1945, and in 1954 received its gold medal for his services to the industry. Mr. Edinger was also a past president of the New Jersey Foundrymen's Association.

HERBERT L. EDINGER

* * *

C. Howard Paul, assistant treasurer, E. W. Bliss Co., Canton, O., died July 3. Mr. Paul was vice president, Mackintosh-Hemphill Co., Pittsburgh, from 1952 until May, when it became a division of Bliss. He joined Mackintosh in 1917, became treasurer and assistant to the president in 1936 and a director in 1944.

* * *

Stephen M. Swain, vice president in charge of research, North American Refractories Co., Cleveland, who died on May 22, had been associated with that company since 1934. The obituary on Mr. Swain in July FOUNDRY erroneously referred to his having been connected with National Refractories in 1940.

* * *

Charles M. Grey, president, C. M. Grey Mfg. Co., East Orange, N. J., died June 21. Mr. Grey founded the die casting firm in 1910. He was a founder and for many years secretary, American Die Casting Institute.

Thomas A. Elder, former secretary-treasurer, Electric Steel Castings Co., Indianapolis, died June 6. Mr. Elder attended Worcester College and joined the company in 1917. He retired eight years ago.

* * *

W. T. Koken, 76, chairman of the board of directors, Banner Iron Works, St. Louis, died June 21.

* * *

R. L. deBrauwere, assistant vice president, Scovill Mfg. Co., and assistant general manager of the company's A. Schrader's Son Division, Brooklyn, N. Y., died June 18. Mr. deBrauwere joined the company over 40 years ago.

* * *

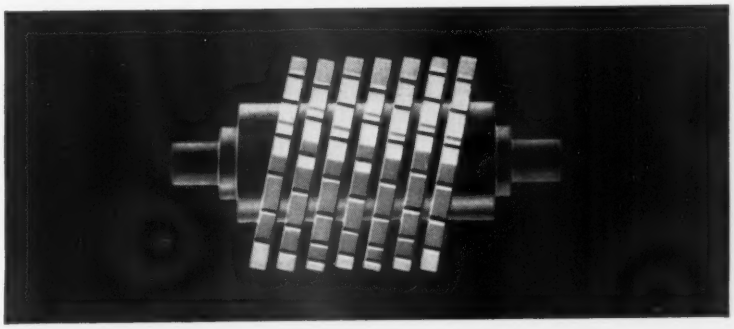
D. Angus Currie, treasurer and chairman of the board of directors, Erie Foundry Co., Erie, Pa., died June 25. Mr. Currie was formerly vice president and president of the company.

* * *

Fred A. Von Gruenigen, 63, chief chemist, American Steel Foundries, Granite City, Ill., died June 28. He was with the company for 35 years.

new ANGLE

for heavy-duty dressing



Desmond's Heavy Duty Dresser makes quick work of truing large, high speed rubber- or resinoid-bonded grinding wheels. Shears and picks at same time with patented angle-set Desmond-Huntington cutters. Dust-shielded ball bearings guarantee lasting precision. Cutters easily replaceable without adjusting bearings. Ask your Desmond distributor how proper dressing can make your grinding wheels serve better—longer.

THE ONLY COMPLETE LINE OF GRINDING WHEEL DRESSERS AND CUTTERS

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THE DESMOND-STEPHAN MFG. CO., URBANA, OHIO

OUR ERIE STRAYER BUCKETS WORK LONG HOURS, NEED LITTLE SERVICE

Reports Max Dozoretz, Partner, Lancaster Iron and Metal Co.

Clamshell buckets are put to many tough jobs. Probably the toughest is handling scrap metal. The constant brush of steel against steel lays up the ordinary bucket for frequent repairs and soon wears it out.

But not an Erie Strayer bucket! Mr. Dozoretz knows Erie Buckets. He has two of them on the job constantly. He says, "We work our Erie buckets hard—eight to ten hours a day, six days a week. We know they'll deliver full payloads with every pass.

"And we lose no time for maintenance! Our first Erie bucket has been in service, continuously, for six years now and is still going strong."

Compare the Erie with any other clamshell. You'll quickly note its finer engineering and the rugged construction that has made it the bucket preferred by experienced operators everywhere.

These Erie Features Mean More Days of More Work

1. Top closing power from block and tackle, plus lever arm construction, plus precision balancing.
2. Manganese steel teeth and high carbon steel lips that bite up full payloads of even toughest clay and gumbo.
3. Rigid, one-piece, welded head that shrugs off bumps and jars. No shimmy. No wobble.
4. Two-line, continuous reeving. Adds up to 50% to cable life. Less down-time for reeving.
5. Low head room for fast work in tight quarters; low center of gravity for easy positioning.

For catalogs, write Dept. F85 Cable Address: EXIMPORT

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Meditations of a Sandman

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"Sand Mix Prescriptions"

FRANK S. BREWSTER insists that we must no longer use the misnomer, "synthetic sand." From now on we shall call it "blended," or, better yet, "formulated." That, I like! The dignity of the sand mixer has been raised to a higher level.

He now becomes very nearly on speaking terms with his neighborhood druggist, for he, too, is a filler of prescriptions. He, too, now is expected to deliver whatever the doctor orders and to adhere faithfully to the prescription. He now must assume the responsibility for either killing or curing the patient.

If, from his "formulated" sand, the shakeout reveals an unending flow of casting perfection (or reasonably so), he may be pardoned for his ill-concealed smile of self-satisfaction. If, however, any of the innumerable defects appear which undeniably reflect sand failure, then our muller-man can sympathize with the druggist who is called to the morgue to witness the result of his "little mistake."

Clyde Sanders is responsible for the statement that a sand mixer in a jobbing shop has a tougher assignment than his counterpart in a large repetition foundry. Well, perhaps those aren't his exact words—so to avoid suit, I shall quote him verbatim: "A jobbing foundry requires the services of a sand-technician more than a production shop because of the great variety of facing mixtures and numerous patterns. Where it is possible to evaluate the data furnished by foundry tests, it is quite easy to recommend the correct prescription for solving foundry problems."

Here you have an example of the danger of quoting from memory. Clyde was speaking of a sand technician, not a sandmixer. However, in spirit my memory of his statement was not too far out of line, for in most small to medium-sized jobbing shops, the sand mixer and technician

are one and the same person. He is both doctor and druggist. (Perhaps that is why he talks to himself so much.)

If a cat is permitted to look questioningly at a king, then perhaps I have the right to disagree with my old friend, Clyde Sanders, about his last statement. He reasoned that where it was possible to evaluate the data furnished by foundry tests, it is quite easy to recommend the correct prescription for solving foundry problems.

Perhaps the fault lies with me, but I seldom am able to evaluate accurately the data furnished by foundry tests, and I never find it easy to recommend the correct prescription. I somehow have the feeling that despite all tests and observation, my "prescription" still is strictly a guess. It may be good, or it may be bad, but nevertheless, it's just a guess!

Most of my sand mixes contain 90 per cent of return or so-called old sand, which comes from five separate molding floors, each of which may require a special sand of widely different properties. The castings range in weight from 1 to 500 lb and demand various proportions of southern and western bentonite, fireclay, seacoal, pitch, woodflour and water. There are deep lifts and flatbacks. One pattern calls for a sand of low deformation and low moisture, whereas another job requires sand properties of quite an opposite nature.

As previously mentioned, the return sand becomes in some respects a conglomerate material and in nearly all others an unknown quantity. When a man is mulling from 10 to 20 tons of sand an hour, time simply does not permit lab tests between batches, and even if it did, unrecognizable variables still would remain.

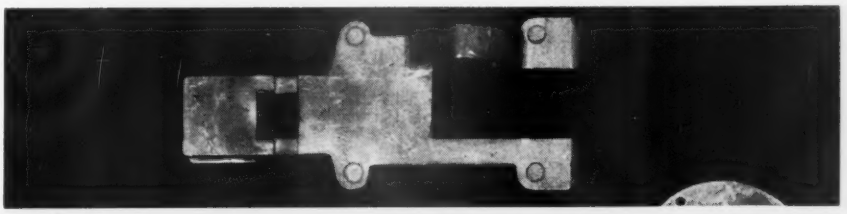
No gentlemen, despite all tests, those of us in jobbing shops still must rely to a great extent on sixth sense, the intuition which governed our predecessors.

Despite the elementary state of our sand knowledge, we have reason to believe that we have made definite gains during the past 20 years. Although I still consider much of our vaunted technique to be just fancy guessing, I must admit that it often proves darned good guessing.

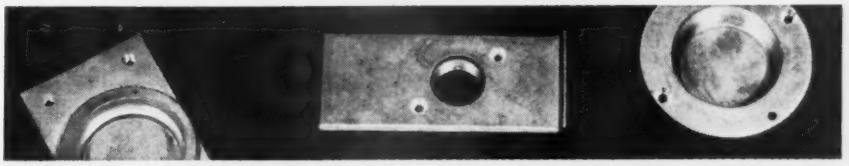
Many of our leading suppliers have instituted laboratory controls and even research projects which unquestionably have advanced foundry sand practice. Better core oils have increased man-hour production, speeded up the making process and reduced loss materially. Cereals, clays and other bonding agents likewise have been improved, and the foundry has

It pays to use

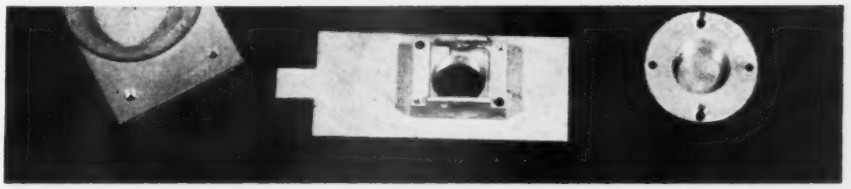
DUREZ *Foundry Resin...*



these castings **COST LESS** *to produce*



COST LESS *to machine*



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When shell molds start with a Durez Resin that sets fast and produces a tough, rigid shell wall, benefits are not measured only in smoother-surfaced castings, fewer rejects, and closer tolerances. The resin also helps to cut costs through fast mold production. Here's a recent example—

"With shell molding we reduced the cost of these bronze hardware castings because of increased speed in making molds," is reported by the Revolving Door Division of International Steel Co., Evansville, Ind. On cost savings in the finished product this user of Durez Foundry Resin adds, "With shell molding we eliminated about 50% of machine operations and the same proportion of grinding and finishing time."

You may now be looking into the value of shell molding for your operations. Or, as a shell molder, you may be aiming at more profitable results. In either case, there's a proven Durez "team" at your service...a foundry resin with an impressive record of success, and a technical organization experienced in cooperating with foundry men. Just drop us a line.

FACTS FROM THE FIELD

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... has tripled our annealing capacity. We particularly like its mechanical features—the Fluid-drive unit for the car, the automatic, power-operated door, and the one push button firing. The mechanical seals are a tremendous improvement over the old sand seals.

On the basis of our experience we recommend it highly."

LES ALEXANDER
Plant Engineer
MINNEAPOLIS ELECTRIC STEEL CASTINGS CO.

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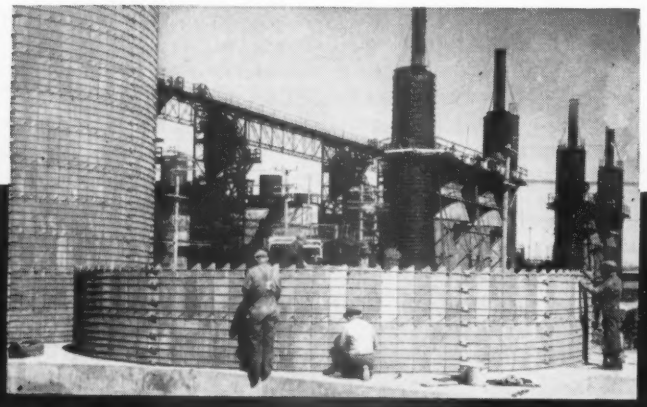

ADVANTAGES OF NEFF & FRY BIN CONSTRUCTION

The photo shows a Neff & Fry Bin being erected alongside another which is completed.

A course of tongued and grooved staves has just been laid up and the steel hoops are being adjusted. Observe that the stave ends are diagonal. All stave ends in a horizontal joint are supported by a hoop, not possible if the staves were rectangular.

Between the joint hoops as many intervening hoops are installed as needed to effect a five-to-one safety factor.

Because of this unique construction, Neff & Fry Bins have extraordinary strength and durability. They last for decades with little or no maintenance expense. They do not spall, rot, rust, or burn.

If you have flowable bulk materials to handle and store, it will pay you to read our folder, "Bins With the Strength of Pillars." *Ask us for a copy.*

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SUPER-CONCRETE STAVE STORAGE BINS

gained accordingly. We now can buy sand with confidence in the analysis, and our modern mixing equipment leaves little to be desired. We have good material and equipment; why then is sand failure so frequently revealed in the cleaning room? The answer undoubtedly is to be found in our use, or misuse, of the stuff we buy.

To mix sand by prescription presupposes an exact knowledge of what is needed for the job in question. Working with all new sand (usually impractical), we are able to come reasonably close to filling the order. Where over 90 per cent of old sand is used (general practice), the problem becomes infinitely more complicated.

Dry and hot strength must be adjusted to meet casting requirements. Evaporation of moisture, due to hot sand, weather conditions, and the time-lag between muller and molder, is a matter of primary consideration. Then there is the problem of having the right amount of this ideal mix prepared on time and delivered at the molder's station for immediate use. However difficult, the prescription mix becomes more and more important as casting requirements become increasingly precise. Tomorrow's sandman may be required to read Latin

FEMA Issues Yearbook

The Foundry Equipment Manufacturers Association has released its annual yearbook containing lists of officers, both present and past, directors, committees, membership roster and listing of the membership by product classification.

Book Review

Elements of Machine Design, by Emanuel Rosenthal and George F. Bischof, cloth, 6 x 9 in., 233 pages, published by McGraw-Hill Book Co., 330 West 42nd St., New York 36. Price $4.50.

Textbook is designed for use in technical institutes, technical high schools and trade schools. It surveys metals and their properties and discusses problems in applied mechanics, power transmission and design stresses for dynamic loading. Book principally concerns itself with the design of principal machine parts—shafts, keys, gears, couplings, bearings, pulleys, clutches and springs.

Text is based on the problem approach to learning by posing a problem for a particular topic, analyzing it and presenting a solution. Treatment is rational and use of higher mathematics is avoided.

AUTOMATIC SAND CONTROLS

reduce scrap, increase sand production, and pay for themselves,

says Nelson Hartley HAYLCO CONTROLS CORP.

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ASSURES THE MOLDER A CONSTANT SAND SUPPLY IN THE HOPPER

HAYLCO CONTROLS *Corporation*
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The original manufacturer of automatic controls for sand systems.

Sanitation Requirements Are Covered in New Standard

American Standards Association, 70 East 45 St., New York 17, has approved "Minimum Requirements for Sanitation in Places of Employment, Z4.1-1955," which prescribes minimum sanitary requirements for protection of employees' health. It covers drinking water, washing and toilet facilities and rest and change rooms.

The standard also covers sanitary lunchrooms and other facilities for food handling in places of employment and gives requirements for ventilation, for housekeeping and waste disposal.

Project was sponsored by the U. S. Public Health Service, with William J. McConnell, Metropolitan Life Insurance Co., New York, as chairman of the committee which developed the standard.

Copies are available from the American Standards Association, 70 East 45th St., New York 17, at 50 cents each.

New Electrode Specifications Issued by Two Societies

Eight new classes of electrodes have been added to the revised edition of Tentative Specifications for Corrosion-Resisting Chromium and Chromium - Nickel Steel Covered Welding Electrodes issued jointly by the American Society for Testing Materials and the American Welding Society (ASTM Designation A 298—55 T; AWS Designation A 5.4—55 T.)

The new classes covered are: Two extra low carbon grades (E308ELC and E316ELC); two columbium grades (E309Cb and E310Cb); two molybdenum grades (E309Mo and E310 MO); and grades E312 and E318.

Copies are available at 40 cents each from American Welding Society, 33 West 39th St., New York 18.

Book Review

Metal Statistics 1955, cloth, 864 pages, 4 x 6 in., published by American Metal Market, 18 Cliff St., New York 7. Price $3.50.

Published since 1907 and now in its 48th edition, *Metal Statistics* 1955, contains up-to-date as well as historical records of production, consumption, stocks, imports and exports, monthly and annual market prices and other statistics of reference value for the iron, steel and metal industries. A buyer's directory also is included.

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Proposed Revised

Tentative Specifications for Foundry Pig Iron

Proposed Revised

Tentative Specifications for Foundry Pig Iron

ASTM Designation: A 43—T

Issued, 1945; Revised, 1949, 1955.

Scope

1. These specifications cover pig irons for foundry use.

Manufacture

2. (a) The pig iron shall be produced by the reduction of iron ores in the blast furnace. However, cast iron produced by other smelting or melting processes and used for the same general purpose as the blast-furnace product shall be considered to be pig iron under these specifications.

(b) Unless otherwise specified, the weight of individual pigs shall not exceed 60 lb.

(c) The pig iron shall be clean and free from excessive amounts of dross and sand.

NOTE.—The term pig iron was derived from the peculiar arrangement of the molds in the early method of casting in a sand bed. The resultant shapes, suitable for handling, into which the metal was cast were called "pigs."

Standard Grades and Compositions

3. The standard grades of pig iron, which are based primarily on phosphorus content, shall conform to the chemical composition requirements prescribed in Table I as to silicon, sulphur phosphorus, and manganese.

Table I—Chemical Requirements

Grade	Si, per cent	S, max per cent	P, per cent	Mn, per cent
		Low-Phosphorus Pig Iron		
LP 1	0.50 to 0.75	0.035	0.035 max.	0.75 max.
LP 2	0.76 to 1.00	0.035	0.035 max.	0.75 max.
LP 3	1.01 to 1.25	0.035	0.035 max.	0.75 max.
LP 4	1.26 to 1.50	0.035	0.035 max.	0.75 max.
LP 5	1.51 to 1.75	0.035	0.035 max.	0.75 max.
LP 6	1.76 to 2.00	0.035	0.035 max.	0.75 max.
LP 7	2.01 to 2.25	0.035	0.035 max.	0.75 max.
LP 8	2.26 to 2.50	0.035	0.035 max.	0.75 max.
LP 9	2.51 to 2.75	0.035	0.035 max.	0.75 max.
LP 10	2.76 to 3.00	0.035	0.035 max.	0.75 max.
LP 11	1.01 to 1.25	0.035	0.035 max.	0.76 to 1.00
LP 12	1.26 to 1.50	0.035	0.035 max.	0.76 to 1.00
LP 13	1.51 to 1.75	0.035	0.035 max.	0.76 to 1.00
LP 14	1.76 to 2.00	0.035	0.035 max.	0.76 to 1.00
LP 15	2.01 to 2.25	0.035	0.035 max.	0.76 to 1.00
LP 16	2.26 to 2.50	0.035	0.035 max.	0.76 to 1.00
LP 17	2.51 to 2.75	0.035	0.035 max.	0.76 to 1.00
LP 18	2.76 to 3.00	0.035	0.035 max.	0.76 to 1.00
LP 19	1.01 to 1.25	0.035	0.035 max.	1.01 to 1.25
LP 20	1.26 to 1.50	0.035	0.035 max.	1.01 to 1.25
LP 21	1.51 to 1.75	0.035	0.035 max.	1.01 to 1.25
LP 22	1.76 to 2.00	0.035	0.035 max.	1.01 to 1.25
LP 23	2.01 to 2.25	0.035	0.035 max.	1.01 to 1.25
LP 24	2.26 to 2.50	0.035	0.035 max.	1.01 to 1.25
LP 25	2.51 to 2.75	0.035	0.035 max.	1.01 to 1.25
LP 26	2.76 to 3.00	0.035	0.035 max.	1.01 to 1.25

Non-Standard Grades and Compositions

4. Pig irons required for special uses which do not conform to the standard grades shown in Table I shall be designated "non-standard." The compositions of non-standard grades ordered under these specifications shall be agreed upon by the manufacturer and the purchaser.

NOTE.—Some non-standard grades of pig iron (for example, higher manganese contents) may be available in all grades including silvery.

Table I (Continued)

Grade	Si, per cent	S, max per cent	P, per cent	Mn, per cent
		Intermediate Low-Phosphorus Pig Iron		
LPi 1	1.00 to 1.25	0.05	0.036 to 0.075	0.75 max.
LPi 2	1.26 to 1.50	0.05	0.036 to 0.075	0.75 max.
LPi 3	1.51 to 1.75	0.05	0.036 to 0.075	0.75 max.
LPi 4	1.76 to 2.00	0.05	0.036 to 0.075	0.75 max.
LPi 5	2.01 to 2.25	0.05	0.036 to 0.075	0.75 max.
LPi 6	2.26 to 2.50	0.05	0.036 to 0.075	0.75 max.
LPi 7	2.51 to 2.75	0.05	0.036 to 0.075	0.75 max.
LPi 8	2.76 to 3.00	0.05	0.036 to 0.075	0.75 max.
LPi 9	1.00 to 1.25	0.05	0.036 to 0.075	0.76 to 1.00
LPi 10	1.26 to 1.50	0.05	0.036 to 0.075	0.76 to 1.00
LPi 11	1.51 to 1.75	0.05	0.036 to 0.075	0.76 to 1.00
LPi 12	1.76 to 2.00	0.05	0.036 to 0.075	0.76 to 1.00
LPi 13	2.01 to 2.25	0.05	0.036 to 0.075	0.76 to 1.00
LPi 14	2 26 to 2.50	0.05	0.036 to 0.075	0.76 to 1.00
LPi 15	2.51 to 2.75	0.05	0.036 to 0.075	0.76 to 1.00
LPi 16	2.76 to 3.00	0.05	0.036 to 0.075	0.76 to 1.00
LPi 17	1.00 to 1.25	0.05	0.036 to 0.075	1.01 to 1.25
LPi 18	1.26 to 1.50	0.05	0.036 to 0.075	1.01 to 1.25
LPi 19	1.51 to 1.75	0.05	0.036 to 0.075	1.01 to 1.25
LPi 20	1.76 to 2.00	0.05	0.036 to 0.075	1.01 to 1.25
LPi 21	2.01 to 2 25	0.05	0.036 to 0.075	1.01 to 1.25
LPi 22	2.26 to 2.50	0.05	0.036 to 0.075	1.01 to 1.25
LPi 23	2.51 to 2.75	0.05	0.036 to 0.075	1.01 to 1.25
LPi 24	2.76 to 3.00	0.05	0.036 to 0.075	1.01 to 1.25
		Bessemer Pig Iron		
Bes 1	1.00 to 1.25	0.05	0.076 to 0.100	1.00 max.
Bes 2	1.26 to 1.50	0.05	0.076 to 0.100	1.00 max.
Bes 3	1.51 to 1.75	0.05	0.076 to 0.100	1.00 max.
Bes 4	1.76 to 2.00	0.05	0.076 to 0.100	1.00 max.
Bes 5	2.01 to 2.25	0.05	0.076 to 0.100	1.00 max.
Bes 6	2.26 to 2.50	0.05	0.076 to 0.100	1.00 max.
Bes 7	2.51 to 2.75	0.05	0.076 to 0.100	1.00 max.
Bes 8	2.76 to 3.00	0.05	0.076 to 0.100	1.00 max.
Bes 9	1.00 to 1.25	0.05	0.076 to 0.100	1.01 to 1.25
Bes 10	1.26 to 1.50	0.05	0.076 to 0.100	1.01 to 1.25
Bes 11	1.51 to 1.75	0.05	0.076 to 0.100	1.01 to 1.25
Bes 12	1.76 to 2.00	0.05	0.076 to 0.100	1.01 to 1.25
Bes 13	2.01 to 2.25	0.05	0.076 to 0.100	1.01 to 1.25
Bes 14	2.26 to 2.50	0.05	0.076 to 0.100	1.01 to 1.25
Bes 15	2.51 to 2.75	0.05	0.076 to 0.100	1.01 to 1.25
Bes 16	2.76 to 3.00	0.05	0.076 to 0.100	1.01 to 1.25

Table I (Continued)

Grade	Si, per cent	S, max per cent Silvery Pig Iron	P, per cent	Mn, per cent
S 1	5.00 to 5.50	0.05	0.30 max.	0.50 to 1.00
S 2	5.51 to 6.00	0.05	0.30 max.	0.50 to 1.00
S 3	6.01 to 6.50	0.05	0.30 max.	0.50 to 1.00
S 4	6.51 to 7.00	0.05	0.30 max.	0.50 to 1.00
S 5	7.01 to 7.50	0.05	0.30 max.	0.50 to 1.00
S 6	7.51 to 8.00	0.05	0.30 max.	0.50 to 1.00
S 7	8.01 to 8.50	0.05	0.30 max.	0.50 to 1.00
S 8	8.51 to 9.00	0.05	0.30 max.	0.50 to 1.00
S 9	9.01 to 9.50	0.05	0.30 max.	0.50 to 1.00
S 10	9.51 to 10.00	0.05	0.30 max.	0.50 to 1.00
S 11	10.01 to 10.50	0.05	0.30 max.	0.50 to 1.00
S 12	10.51 to 11.00	0.05	0.30 max.	0.50 to 1.00
S 13	11.01 to 11.50	0.05	0.30 max.	0.50 to 1.00
S 14	11.51 to 12.00	0.05	0.30 max.	0.50 to 1.00
S 15	12.01 to 12.50	0.05	0.30 max.	0.50 to 1.00
S 16	12.51 to 13.00	0.05	0.30 max.	0.50 to 1.00
S 17	13.01 to 13.50	0.05	0.30 max.	0.50 to 1.00
S 18	13.51 to 14.00	0.05	0.30 max.	0.50 to 1.00
S 19	14.01 to 14.50	0.05	0.30 max.	0.50 to 1.00
S 20	14.51 to 15.00	0.05	0.30 max.	0.50 to 1.00
S 21	15.01 to 15.50	0.05	0.30 max.	0.50 to 1.00
S 22	15.51 to 16.00	0.05	0.30 max.	0.50 to 1.00
S 23	16.01 to 16.50	0.05	0.30 max.	0.50 to 1.00
S 24	16.51 to 17.00	0.05	0.30 max.	0.50 to 1.00
S 25	5.00 to 5.50	0.05	0.30 max.	1.01 to 1.50
S 26	5.51 to 6.00	0.05	0.30 max.	1.01 to 1.50
S 27	6.01 to 6.50	0.05	0.30 max.	1.01 to 1.50
S 28	6.51 to 7.00	0.05	0.30 max.	1.01 to 1.50
S 29	7.01 to 7.50	0.05	0.30 max.	1.01 to 1.50
S 30	7.51 to 8.00	0.05	0.30 max.	1.01 to 1.50
S 31	8.01 to 8.50	0.05	0.30 max.	1.01 to 1.50
S 32	8.51 to 9.00	0.05	0.30 max.	1.01 to 1.50
S 33	9.01 to 9.50	0.05	0.30 max.	1.01 to 1.50
S 34	9.51 to 10.00	0.05	0.30 max.	1.01 to 1.50
S 35	10.01 to 10.50	0.05	0.30 max.	1.01 to 1.50
S 36	10.51 to 11.00	0.05	0.30 max.	1.01 to 1.50
S 37	11.01 to 11.50	0.05	0.30 max.	1.01 to 1.50
S 38	11.51 to 12.00	0.05	0.30 max.	1.01 to 1.50
S 39	12.01 to 12.50	0.05	0.30 max.	1.01 to 1.50
S 40	12.51 to 13.00	0.05	0.30 max.	1.01 to 1.50
S 41	13.01 to 13.50	0.05	0.30 max.	1.01 to 1.50
S 42	13.51 to 14.00	0.05	0.30 max.	1.01 to 1.50
S 43	14.01 to 14.50	0.05	0.30 max.	1.01 to 1.50
S 44	14.51 to 15.00	0.05	0.30 max.	1.01 to 1.50
S 45	15.01 to 15.50	0.05	0.30 max.	1.01 to 1.50
S 46	15.51 to 16.00	0.05	0.30 max.	1.01 to 1.50
S 47	16.01 to 16.50	0.05	0.30 max.	1.01 to 1.50
S 48	16.51 to 17.00	0.05	0.30 max.	1.01 to 1.50
S 49	5.00 to 5.50	0.05	0.30 max.	1.51 to 2.00
S 50	5.51 to 6.00	0.05	0.30 max.	1.51 to 2.00
S 51	6.01 to 6.50	0.05	0.30 max.	1.51 to 2.00
S 52	6.51 to 7.00	0.05	0.30 max.	1.51 to 2.00
S 53	7.01 to 7.50	0.05	0.30 max.	1.51 to 2.00
S 54	7.51 to 8.00	0.05	0.30 max.	1.51 to 2.00
S 55	8.01 to 8.50	0.05	0.30 max.	1.51 to 2.00
S 56	8.51 to 9.00	0.05	0.30 max.	1.51 to 2.00
S 57	9.01 to 9.50	0.05	0.30 max.	1.51 to 2.00
S 58	9.51 to 10.00	0.05	0.30 max.	1.51 to 2.00
S 59	10.01 to 10.50	0.05	0.30 max.	1.51 to 2.00
S 60	10.51 to 11.00	0.05	0.30 max.	1.51 to 2.00
S 61	11.01 to 11.50	0.05	0.30 max.	1.51 to 2.00
S 62	11.51 to 12.00	0.05	0.30 max.	1.51 to 2.00
S 63	12.01 to 12.50	0.05	0.30 max.	1.51 to 2.00
S 64	12.51 to 13.00	0.05	0.30 max.	1.51 to 2.00
S 65	13.01 to 13.50	0.05	0.30 max.	1.51 to 2.00
S 66	13.51 to 14 00	0.05	0.30 max.	1.51 to 2.00
S 67	14.01 fo 14.50	0.05	0.30 max.	1.51 to 2.00
S 68	14.51 to 15 00	0.05	0.30 max.	1.51 to 2.00
S 69	15.01 to 15.50	0.05	0.30 max.	1.51 to 2.00
S 70	15.51 to 16.00	0.05	0.30 max.	1.51 to 2.00
S 71	16.01 to 16.50	0.05	0.30 max.	1.51 to 2.00
S 72	16.51 to 17.00	0.05	0.30 max.	1.51 to 2.00

Elements in Pig Iron, Other than Silicon, Sulphur, Phosphorus, and Manganese

5. (a) When the total carbon content and its uniformity is important special agreement as to this element shall be made by agreement between the manufacturer and the purchaser.

NOTE.—The carbon content of pig iron, while important, is not controllable within close limits, is very difficult to determine accurately, and is therefore customarily not specified.

Grade	Si, per cent	S, max per cent	P, per cent	Mn, per cent
	Foundry Low-Phosphorus Pig Iron			
Fl 1	1.75 max.	0.05	0.31 to 0.50	0.50 to 0.75
Fl 2	1.76 to 2.00	0.05	0.31 to 0.50	0.50 to 0.75
Fl 3	2.01 to 2.25	0.05	0.31 to 0.50	0.50 to 0.75
Fl 4	2.26 to 2.50	0.05	0.31 to 0.50	0.50 to 0.75
Fl 5	2.51 to 2.75	0.05	0.31 to 0.50	0.50 to 0.75
Fl 6	2.76 to 3.00	0.05	0.31 to 0.50	0.50 to 0.75
Fl 7	3.01 to 3.25	0.05	0.31 to 0.50	0.50 to 0.75
Fl 8	3.26 to 3.50	0.05	0.31 to 0.50	0.50 to 0.75
Fl 9	1.75 max.	0.05	0.31 to 0.50	0.76 to 1.00
Fl 10	1.76 to 2.00	0.05	0.31 to 0.50	0.76 to 1.00
Fl 11	2.01 to 2.25	0.05	0.31 to 0.50	0.76 to 1.00
Fl 12	2.26 to 2.50	0.05	0.31 to 0.50	0.76 to 1.00
Fl 13	2.51 to 2.75	0.05	0.31 to 0.50	0.76 to 1.00
Fl 14	2.76 to 3.00	0.05	0.31 to 0.50	0.76 to 1.00
Fl 15	3.01 to 3.25	0.05	0.31 to 0.50	0.76 to 1.00
Fl 16	3.26 to 3.50	0.05	0.31 to 0.50	0.76 to 1.00
Fl 17	1.75 max.	0.05	0.31 to 0.50	1.01 to 1.25
Fl 18	1.76 to 2.00	0.05	0.31 to 0.50	1.01 to 1.25
Fl 19	2.01 to 2.25	0.05	0.31 to 0.50	1.01 to 1.25
Fl 20	2.26 to 2.50	0.05	0.31 to 0.50	1.01 to 1.25
Fl 21	2.51 to 2.75	0.05	0.31 to 0.50	1.01 to 1.25
Fl 22	2.76 to 3.00	0.05	0.31 to 0.50	1.01 to 1.25
Fl 23	3.01 to 3.25	0.05	0.31 to 0.50	1.01 to 1.25
Fl 24	3.26 to 3.50	0.05	0.31 to 0.50	1.01 to 1.25
	Malleable Pig Iron			
M 1	0.75 to 1.00	0.05	0.101 to 0.30	0.50 to 0.75
M 2	1.01 to 1.25	0.05	0.101 to 0.30	0.50 to 0.75
M 3	1.26 to 1.50	0.05	0.101 to 0.30	0.50 to 0.75
M 4	1.51 to 1.75	0.05	0.101 to 0.30	0.50 to 0.75
M 5	1.76 to 2.00	0.05	0.101 to 0.30	0.50 to 0.75
M 6	2.01 to 2.25	0.05	0.101 to 0.30	0.50 to 0.75
M 7	2.26 to 2.50	0.05	0.101 to 0.30	0.50 to 0.75
M 8	2.51 to 2.75	0.05	0.101 to 0.30	0.50 to 0.75
M 9	2.76 to 3.00	0.05	0.101 to 0.30	0.50 to 0.75
M 10	3.01 to 3.25	0.05	0.101 to 0.30	0.50 to 0.75
M 11	3.26 to 3.50	0.05	0.101 to 0.30	0.50 to 0.75
M 12	0.75 to 1.00	0.05	0.101 to 0.30	0.76 to 1.00
M 13	1.01 to 1.25	0.05	0.101 to 0.30	0.76 to 1.00
M 14	1.26 to 1.50	0.05	0.101 to 0.30	0.76 to 1.00
M 15	1.51 to 1.75	0.05	0.101 to 0.30	0.76 to 1.00
M 16	1.76 to 2.00	0.05	0.101 to 0.30	0.76 to 1.00
M 17	2.01 to 2.25	0.05	0.101 to 0.30	0.76 to 1.00
M 18	2.26 to 2.50	0.05	0.101 to 0.30	0.76 to 1.00
M 19	2.51 to 2.75	0.05	0.101 to 0.30	0.76 to 1.00
M 20	2.76 to 3.00	0.05	0.101 to 0.30	0.76 to 1.00
M 21	3.01 to 3.25	0.05	0.101 to 0.30	0.76 to 1.00
M 22	3.26 to 3.50	0.05	0.101 to 0.30	0.76 to 1.00
M 23	0.75 to 1.00	0.05	0.101 to 0.30	1.01 to 1.25
M 24	1.01 to 1.25	0.05	0.101 to 0.30	1.01 to 1.25
M 25	1.26 to 1.50	0.05	0.101 to 0.30	1.01 to 1.25
M 26	1.51 to 1.75	0.05	0.101 to 0.30	1.01 to 1.25
M 27	1.76 to 2.00	0.05	0.101 to 0.30	1.01 to 1.25
M 28	2.01 to 2 25	0.05	0.101 to 0.30	1.01 to 1.25
M 29	2.26 to 2.50	0.05	0.131 to 0.30	1.01 to 1.25
M 30	2.51 to 2.75	0.05	0.101 to 0.30	1.01 to 1.25
M 31	2.76 to 3.00	0.05	0.101 to 0.30	1.01 to 1.25
M 32	3.01 to 3.25	0.05	0.101 to 0.30	1.01 to 1.25
M 33	3.26 to 3.50	0.05	0.101 to 0.30	1.01 to 1.25

(Concluded in September)

Two Compartment Car Type Mold Drying Oven.
Two Compartment Rack Type Core Oven.
Single Compartment Rack Type Core Oven.
LANLY
FOUNDRY OVENS
THE LANLY COMPANY • 780 PROSPECT AVE
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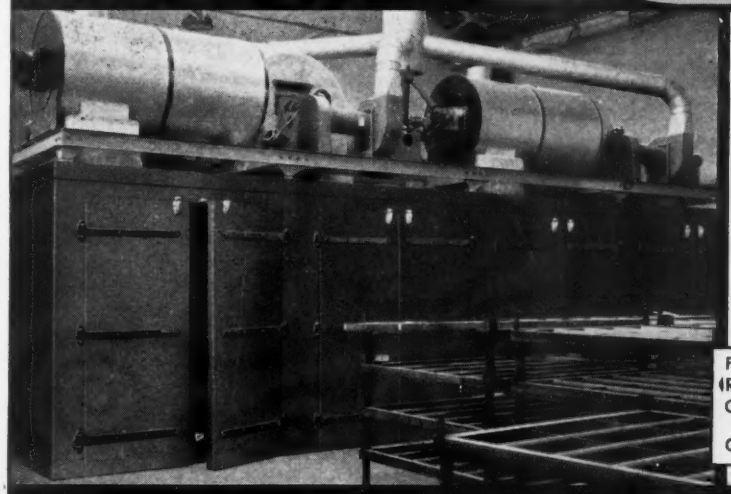
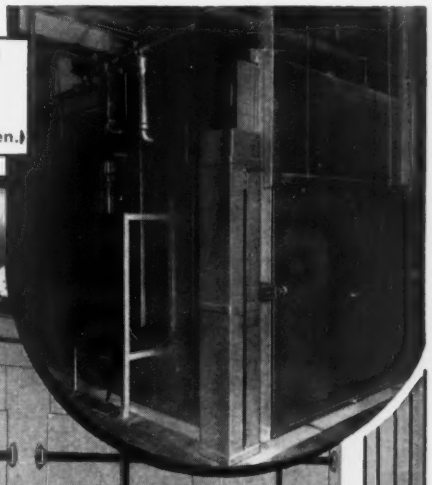


The Lanly reputation has been established as the result of the consistent incorporation of advanced, efficient design and high grade construction into every Lanly installation.

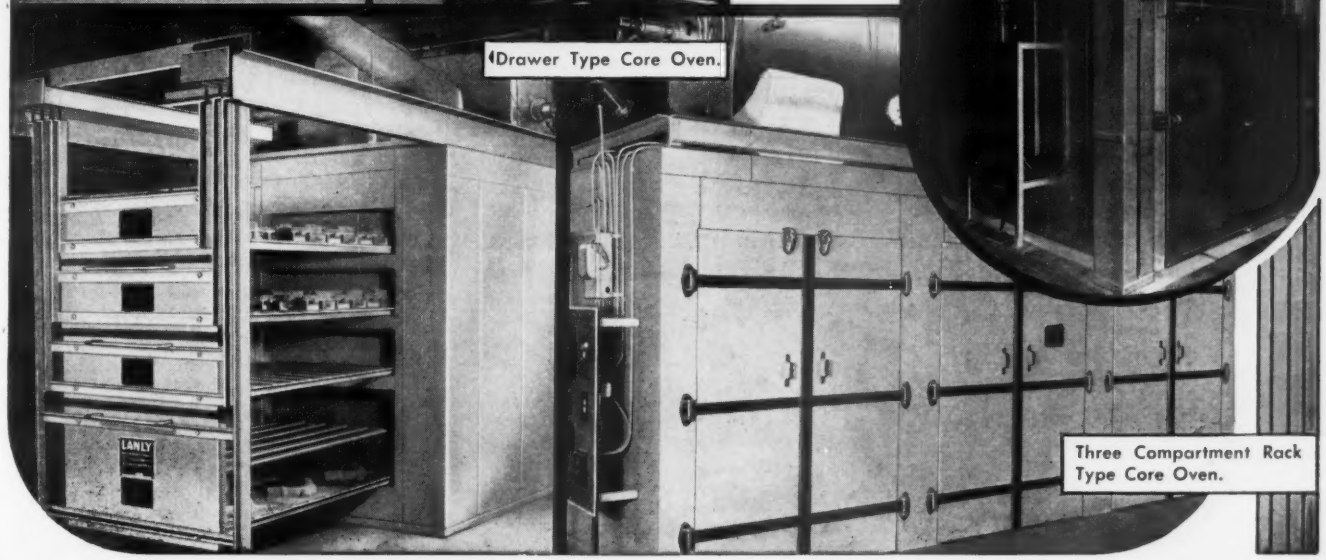
Core baking, pasting and mold drying ovens as well as casting conditioning and heat-treating ovens are available in standard units.

Write for Literature and Complete Information.



Four Compartment Rack Type Core Oven.

Car Type Core Oven.



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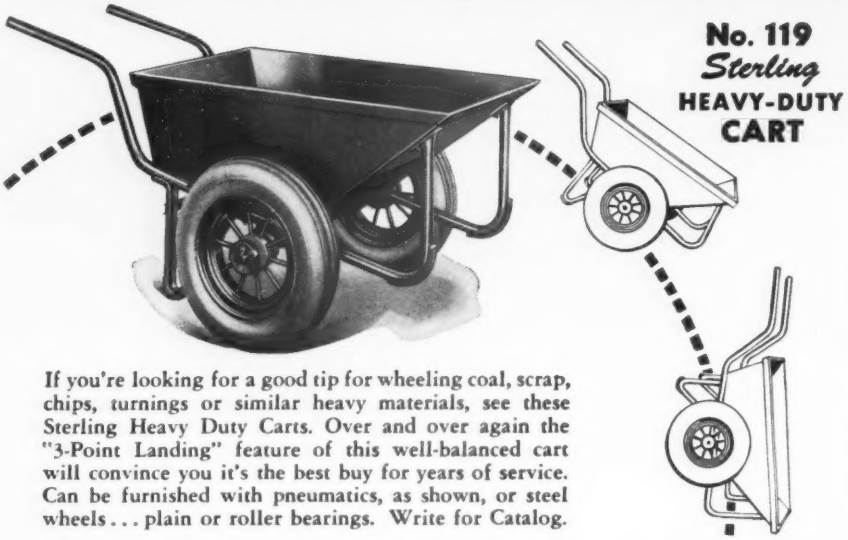

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HEAVY-DUTY CART

If you're looking for a good tip for wheeling coal, scrap, chips, turnings or similar heavy materials, see these Sterling Heavy Duty Carts. Over and over again the "3-Point Landing" feature of this well-balanced cart will convince you it's the best buy for years of service. Can be furnished with pneumatics, as shown, or steel wheels . . . plain or roller bearings. Write for Catalog.

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TRADE . . Publications

For More Details Use Reply Card—Page 195

PROPORTIONING SYSTEMS: Richardson Scale Co., Clifton, N. J.—Bulletin 0351 and technical reference 55A provide information on company's automatic proportioning systems and a foundry sand and core binder proportioning system, respectively. Pictures illustrate a foundry installation using eight automatic scales to weigh sand and core binders with one man directing the operation of scales, skip hoists, mullers, liquid meters, swivel spout and collector conveyor from a remote panel board.
For More Details Circle No. 141—Page 195

TRANSMISSION SYSTEMS: Industrial Actuators and Controls Division, National Pneumatic Co., 125 Amory St., Boston 19, Mass.—Details on the company's line of pneumatic-hydraulic actuators and controls for industrial production machinery are contained in Bulletin I.C.-2.2, illustrated with schematic drawings and photographs. Bulletin IC-2.3 gives complete data on power drive cylinder for fluid power transmission.
For More Details Circle No. 142—Page 195

INDUSTRIAL SITES: Upper Kanawha Valley Development Association, Montgomery, W. Va.—Booklet describes Upper Kanawha Valley of West Virginia with its industrial advantages and facilities available to industry. It contains statistics on employment, resources and transportation as well as a colored map of the area.
For More Details Circle No. 143—Page 195

BONDING AND FIRE CLAY: Cedar Heights Clay Co., 50 Portsmouth Rd., Oak Hill, O.—Bulletin desecribes processing and packaging of the company's bonding and fire clay. Types and meshes available for all requirements are listed.
For More Details Circle No. 144—Page 195

GAGE BLOCKS: Fonda Gage Corp., Dept. M-14, Stamford, Conn.—Looseleaf illustrated bulletin describes line of rectangular and hoke type gage blocks in steel and tungsten carbide with accessories.
For More Details Circle No. 145—Page 195

POWER ROOM EXHAUSTERS: Chicago Blower Corp., 9869 Pacific Ave., Franklin Park, Ill.— Bulletin CAM-102 presents detailed information and performance tables on axial mushroom power room exhausters for industrial applications.
For More Details Circle No. 146—Page 195

GRINDING TOOL: Continental Products Inc., Dept. 6A, 872 East 140th St., Cleveland 10, O.—Wheel for all types of grinding operations, available in a variety of sizes to fit all standard grinding machines, is

described in a 4-page folder. Tool features adjustable abrasive segments, making it possible to increase or decrease diameter as desired.
For More Details Circle No. 147—Page 195

ROTARY BLOWERS: Dexter Folder Co., Miehle-Dexter Supercharger Division, 100 Fourth St., Racine, Wis.—Bulletin 255 describes lightweight, compact, rotary positive blowers used in moving air or gas at blower pressures up to 15 psig or higher in stages. Vacuum to 15 in. hg. Capacities from 50 to 4000 cfm.
For More Details Circle No. 148—Page 195

SOUND CONDITIONING: Vermiculite Institute, 208 South LaSalle St., Chicago 4, Ill.—Booklet, "The Silent Treatment," covers accoustical plastic and its application for sound conditioning and fire protection. Table of physical data, standard specifications for manual and machine application, and sketches are contained.
For More Details Circle No. 149—Page 195

THERMOCOUPLE CHECKER: Peerless Electric Co., Electronics Division, 1401 West Market St., Warren, O.—Catalog R-22 describes device for correcting inaccurate temperature reading and control caused by thermocouple circuit failure during heat treating and melting operations.
For More Details Circle No. 150—Page 195

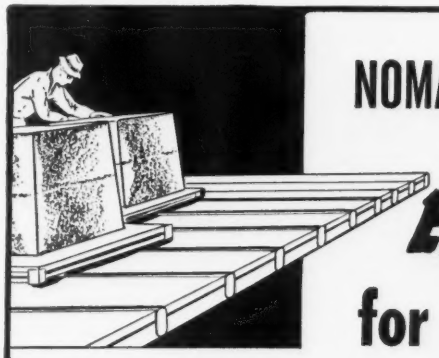
HANDLING EQUIPMENT: Syntron Co., 540 Lexington Ave., Homer City, Pa.—Catalog 554 gives information on vibratory equipment including feeders, conveyors and other materials handling equipment. Fifty pages of technical data and photographs are included.
For More Details Circle No. 151—Page 195

SANDBLAST EQUIPMENT: Clementina Ltd., 2277 Jerrold Ave., San Francisco 24, Calif.—Catalog contains illustrations of 14 different models from 150 to 1350-lb sand capacity. Sand control valves, nozzles, couplings and hose are among the accessory items listed.
For More Details Circle No. 152—Page 195

PATTERN COATING: Carboline Co., 7603 Forsyth Blvd., St. Louis 5, Mo.—Bulletin A-60 provides information on a hard, durable, glossy thermosetting resin coating for protecting wood patterns against wear and dry rot. Details on how to apply the material also are included.
For More Details Circle No. 153—Page 195

PUMPS AND COMPRESSORS: Pennsylvania Pump & Compressor Co., Easton, Pa.—Air and gas compressors, dry vacuum and centrifugal pumps, check valves and aftercoolers are described in bulletin 603. Sizes, capacities and ratings are tabulated.
For More Details Circle No. 154—Page 195

ABRASIVE WHEEL: C. R. Vogt & Co., 1528 Third Ave., Moline M13, Ill.—Data sheet provides information on an abrasive wheel of neoprene rub-



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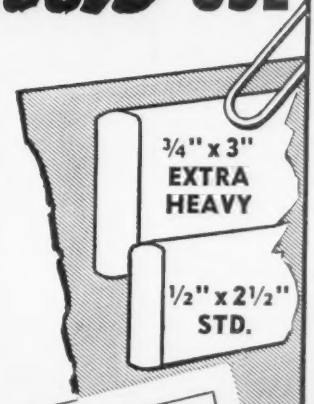

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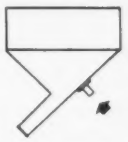
FOUNDRY EQUIPMENT

BIN
STUCK LATELY?



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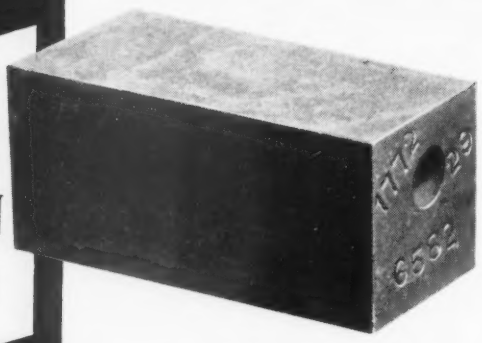
HOW TO END SLAG HOLE FAILURES



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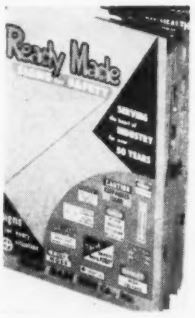
ber bonded permanently to a cast aluminum wheel said to perform equally well on grinding, sanding, polishing and deburring applications.
For More Details Circle No. 155—Page 195

FRONT END LOADERS: Sherman Products Inc., 3200 West 14 Mile Rd., Royal Oak, Mich.—Booklet describes front end loader for use on Fordson diesel tractors. Two models are described with capacities of 2500 and 2000 lb, respectively. On-the-job illustrations, along with special accessories, features and specifications are included.
For More Details Circle No. 156—Page 195

SAFETY SIGNS: Ready Made Sign Co., 115 Worth St., New York 13, N. Y.—Color catalog illustrates over 2200 stock metal signs and safety tags for use as aids in preventing accidents. Signs are shown in actual colors in which they are available. Many can be supplied in foreign languages. All are manufactured in accordance with American Standards Association specifications for industrial accident protection and are made either in porcelain enamel or high baked-paint finishes.



For More Details Circle No. 157—Page 195

DIE CASTING MACHINE: Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, O.— Bulletin describes high-pressure hydraulic hot chamber die casting machine of 200 tons locking pressure. It can be converted to a cold chamber unit by changing hot metal end.
For More Details Circle No. 158—Page 195

TRUCK ATTACHMENT: Raymond Corp., 65-134 Madison St., Greene, N. Y.—Bulletin 151 illustrates a portable loading or unloading dock for motor trucks which elevates and lowers 6000-lb loads from ground level to 56½ in. high.
For More Details Circle No. 159—Page 195

INJECTOR BURNERS: Eclipse Fuel Engineering Co., 1125 Buchanan St., Rockford, Ill.—Combination mixer and burner for high pressure gas up to 25 lb is illustrated in bulletin H-63T. Specific burner dimensions and pressure capacities are shown.
For More Details Circle No. 160—Page 195

REVERBERATORY FURNACES: Eclipse Fuel Engineering Co., 1002 Buchanan St., Rockford, Ill.—Cutaway views, product photos and specifications of soft metal reverberatory furnace of dry hearth type are found in Bulletin C-80.
For More Details Circle No. 161—Page 195

STEEL HARDENING COMPOUND: Armor-Tuf Sales Corp., 299 Madison Ave., New York 17, N. Y.—

Folder describes process for heat treating of steel production parts and tools by "painting" rather than soaking for hours in furnaces at elevated temperatures. Liquid used is painted on gears, cams, studs, and tools like cold water paint. Hardening time is reduced to minutes instead of hours.
For More Details Circle No. 162—Page 195

CORE SAND BINDER: Hercules Powder Co., Naval Stores Dept., Wilmington 99, Del.—Folder pictorially describes advantages of using company's binder in core sands. Folder explains how the binder eliminates oven bottlenecks in coreroom, reduces sand cost, resists moisture pickup in the mold, provides strength to bonded cores and permits easy core removal.
For More Details Circle No. 163—Page 195

CASTING PROCESS: Howard Foundry Co., 1700 North Kostner Ave., Chicago 39, Ill.—Bulletin on combination plaster mold-investment casting processes shows what can be done in producing microwave fittings that are dense, have fine as-cast finishes and close as-cast tolerances.
For More Details Circle No. 164—Page 195

QUENCHING OILS: Sinclair Refining Co., 600 Fifth Ave., New York, N. Y.—Technical bulletin details qualities of quenching oil used to upgrade lower cost steels for more critical uses and to produce heat treated parts of higher hardness.
For More Details Circle No. 165—Page 195

FLOOR MAINTENANCE: Maintenance Inc., Wooster, O.—Folder M-1219C covers floor maintenance materials recommended for a wide range of floor repairing and resurfacing.
For More Details Circle No. 166—Page 195

FOUNDRY reprints

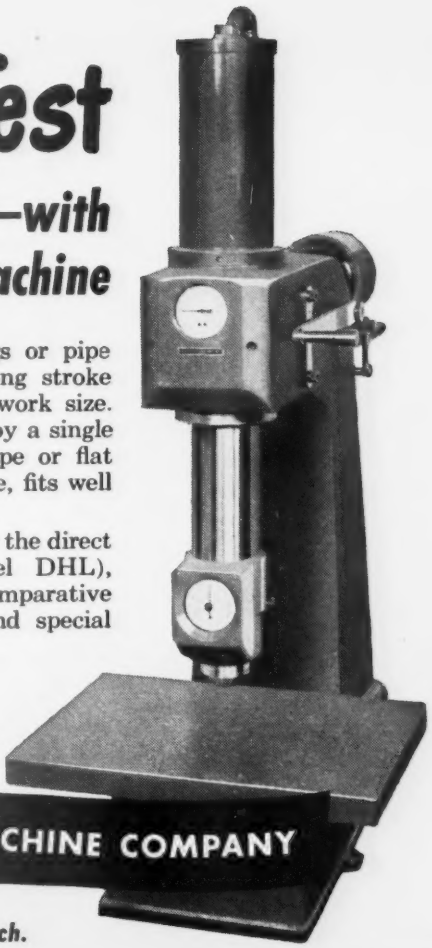
Application of Fork Trucks to Foundry Handling Problems points out several areas where use of fork lift trucks can reduce man-hours, increase efficiency and cut costs of in-plant materials handling.
For a Copy Circle No. 167—Page 195

Steel Penetration by R. C. Emmons and Jack Bach suggests means of correcting penetration of molten steel into the mold surface. Article is based upon recent investigations conducted at Falk Corp., Milwaukee, and University of Wisconsin.
For a Copy Circle No. 168—Page 195

Nondestructive Testing Aids Casting Design by Robert H. Herrmann describes use of brittle lacquer in designing high-strength, minimum weight castings with desirable uniform stress characteristics. Application of the lacquer indicates stress areas on a casting and when the lacquer is used in conjunction with strain gages and strain indicators somewhat more accurate stress values can be obtained.
For a Copy Circle No. 169—Page 195

Brinell Test

large pieces fast—with this long stroke machine



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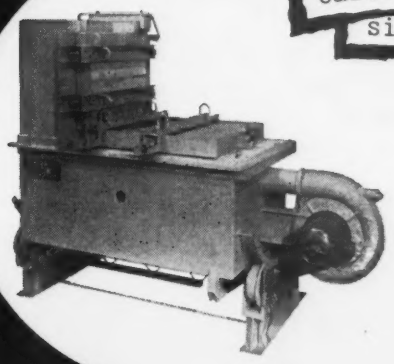

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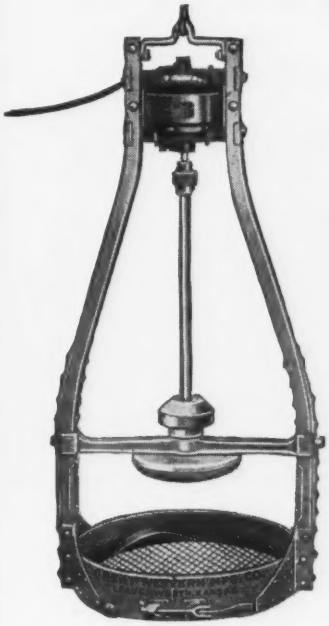

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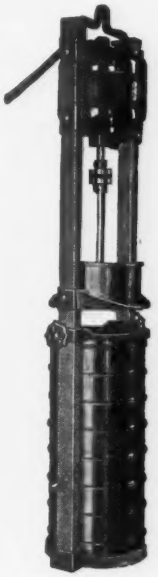

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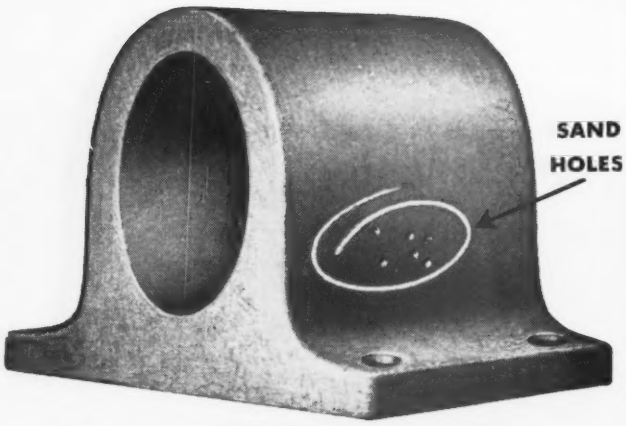

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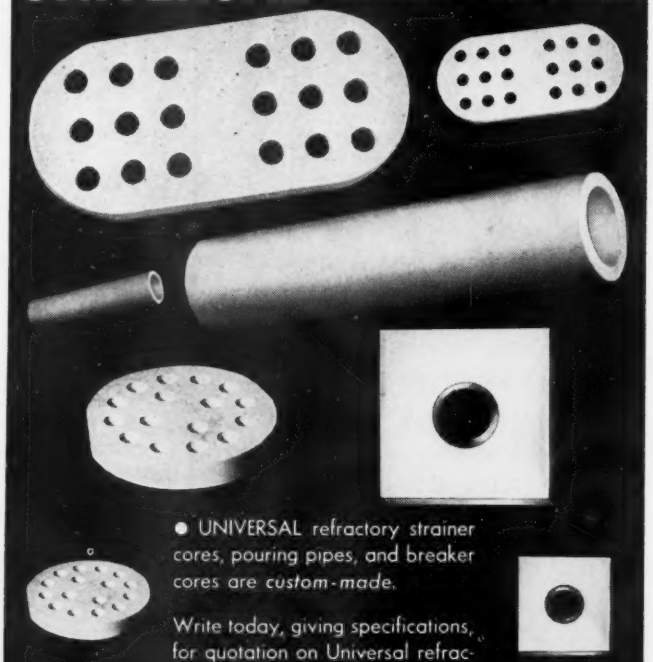

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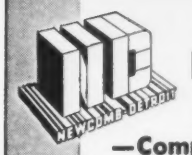

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Long Life REPLACEMENT BLADES

increase blast cleaning output

TISCO Replacement Blades to fit Wheelabrators* regularly last as long as five times the life of other blades in actual service. This, of course, means a substantial *reduction in machine down-time* for blade replacement and a corresponding *increase in output.* The net result is a *marked saving* in blast cleaning costs.

TISCO Replacement Blades are made of a special wear-resistant alloy by effective fabricating methods developed by Taylor-Wharton, the oldest American manufacturer of high alloy steels. The blades are heat treated and oil-quenched to a Rockwell C hardness of 65. All fitting dimensions are accurately ground and wearing surfaces have maximum smoothness. TISCO Blades are balanced in sets. Specify them from your local authorized dealer, or order direct from us.

TISCO Blades are carried by foundry dealers throughout the United States and Canada.

*Reg. U. S.-Pat. Off. by American Wheelabrator and Equipment Corp.

FOUNDED 1742

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IRON AND STEEL CO.
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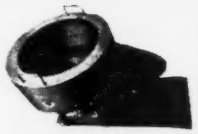
CENTRIFUGAL CASTING MACHINES

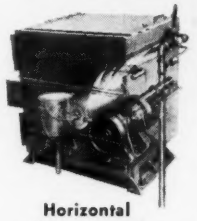
Vertical



Vertical Water-Cooled

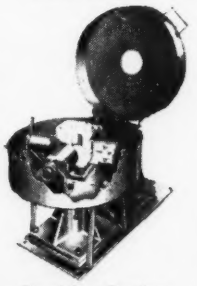
These machines used to make ferrous and non-ferrous centrifugal castings are produced by the pioneer manufacturer of such equipment.

They are made in a large variety of styles and a wide range of sizes. Complete technical information is supplied concerning sand and permanent mold design, gating, sand mixes, speeds, etc.



Horizontal Water-Cooled

Send us drawings or sketches of parts you are interested in casting centrifugally, and we will tell you, without obligation, if and how our machines can cast them faster, cleaner and with fewer rejects.



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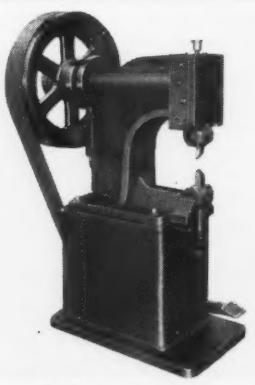

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Sprue Cutter

for

Non-Ferrous Foundries

- Cuts Sprues and Gates with One, Swift, Sure Stroke.
- Does away with tedious hand labor.
- Speeds flow of work through cleaning department.
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Write for Illustrated Bulletin

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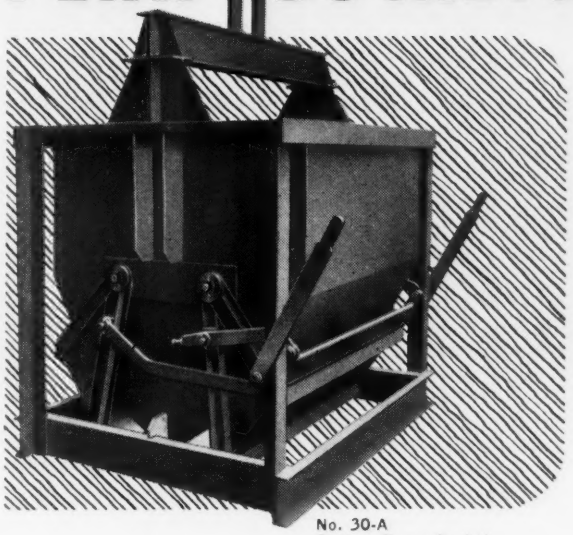

No. 30-A
Bottom Dump Bucket

Exclusive design makes this bottom dump bucket easy to operate . . . easy to open. Efficient for foundry use in handling all types of sand, moulding or core, dry or prepared. Can be used with coke, scrap iron and castings also. Sizes 7 to 200 cu. ft.

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FOUNDRY COKE

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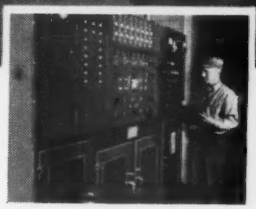

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An 800% INCREASE in production per man,
A 90% LABOR SAVING

That's the success story of one Richardson foundry application.

PROBLEM:

To provide a system of control for the batching of sand and core-binder in the production of steel castings; to coordinate batching machinery with the timed discharge of the automatic scales; to provide infallible electric and mechanical checks to assure immediate stoppage of cycle when any phase of operation is incorrect.

SOLUTION:

A materials handling system consisting of 9 bins, 8 automatic scales, 1 collector conveyor, 1 swivel spout, liquid meters, master control panel, 2 skip hoists, 2 mullors, and reject plows. All weighing and control equipment designed, manufactured and installed by Richardson.

In such a formulating system, using the Richardson equipment specified, G-E engineers in the Everett, Mass., Foundry were able to achieve the outstanding results mentioned above. Sand formulation is now a strictly controlled operation approaching full automation not only in function but in quality control as well. A single operator at a panel board can remotely initiate, sustain, change, or interrupt batch formulation merely by adjusting electric controls. Major advantages of a Richardson system—in addition to increased capacity, labor savings, and quality control—are greater flexiblity, material savings, decreased waste, and easier maintenance.

Richardson engineers are specialists in materials handling by weight . . . have designed feeding, weighing, proportioning and conveying systems for practically all the processing industries. For any problem in materials handling by weight, look to Richardson for the economical, efficient solution.

Feeder-Weighing Systems of All Types. Automatic Bulk Weighing Hopper Scales, Including Conveyor-Feed Types —Continuous Feeder-Weighers—Automatic Bagging Scales —Bag-Sewing Conveyors—Packers—Process Control Panels. *Branch Offices in:* Atlanta • Boston • Buffalo • Chicago • Cincinnati • Detroit • Houston • Memphis • Minneapolis • New York • Omaha • Philadelphia • Pittsburgh • San Francisco • Wichita • Montreal • Toronto • Havana • Mexico City • San Juan

Richardson
MATERIALS HANDLING BY WEIGHT SINCE 1902

1701

A typical MOCO Car or Rack Foundry Oven utilizing the benefits of horizontal air recirculation.

What the Benefits of Maximum Air Recirculation--*Horizontally* Mean to your Oven Application

An inefficient oven operation may well be pushing your production costs higher than necessary. If so, you'll want all the facts on this improved method of foundry heat processing.

Here's what MOCO'S horizontal air recirculation means to you: greater volume of recirculated air providing a new high in temperature uniformity; fast baking; elimination of hot spots. Your production is increased —waste eliminated—costs reduced.

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Low scrap factors are built into every Acme pattern through 30 years of experience serving the major industries of American business.

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CUTS COSTS

American cleans *better, faster* because American is made of finest raw materials, produced by the most modern equipment and backed by years of metallurgical experience. The result is uniformly hardened and graded *solid* particles—free from strings and tails. All sizes; 100 lb. bags.

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WELDED AND BOLTED TYPES • ALL SIZES • COMPLETE CONTROL EQUIPMENT • 28 YEARS A LEADER IN MAGNETIC MATERIALS HANDLING.

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CUT GATES AND RISERS *FASTER!*

The world's largest foundries now use LENOX band saw blades — because LENOX makes a special blade for cutting non-ferrous metals.

Tests show that the famous LENOX "Skip-A-Tooth" blades cut faster and last longer. LENOX "Skip-A-Tooth" has a coarse pitch and a *round* gullet for easy chip clearance.

Which type of blade is best for your cutting operations? Get the answer by writing us. No obligation, of course.

AMERICAN SAW & MFG. CO.
Springfield, Mass.

Please send me complete information on the LENOX Band Saw Blade for cutting Non-ferrous Metals:

☐ Aluminum ☐ Magnesium ☐ Brass ☐ Bronze

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COLUMBIA-SOUTHERN

SODA BRIQUETTES

The size and shape of Columbia-Southern Soda Briquettes have been scientifically designed to do a faster, better desulphurizing job in Blast Furnace and Foundry operations.

The walnut form exposes maximum surface area and it is a known fact that the amount of contact is a highly important factor in determining the percentage of sulphur reduction.

Aside from speedy and efficient desulphurization, Columbia-Southern Soda Briquettes accelerate production, increase fluidity, quicken the release of gases and impurities, allow for automatic slag skimming, and improve the refining value of the iron.

Order your supply today by name "Columbia-Southern Soda Briquettes." Packed in 100 lb. paper bags; easy to handle and store.

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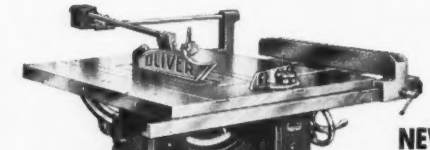
"OLIVER" Saw Benches help patternmakers do better work faster



NEW Automatic Saw Guard with Anti-Kick Back Catch assures maximum safety

This compact "Oliver" is built for accurate ripping, cross cutting, mitering and dadoing. The saw arbor can be quickly tilted up to 45°. Gauges and table are graduated to cut a perfect miter, cut-off to length, or rip to width accurately—no delays for checking measurements. Rips to 16" wide to left of saw, 28" to right. Cross cuts up to 16" wide, 3" thick. Write for Bulletin No. 270D.

OLIVER MACHINERY COMPANY

Established 1890 **GRAND RAPIDS 2, MICHIGAN**

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For all annealing and heat treating requirements

THE ELECTRIC FURNACE CO. • SALEM, OHIO

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Take the King PORTABLE to the work—not the work to the tester

USE THE KING PORTABLE

To Make Standard Brinell Tests

Puts an actual load of 3000 kg. on a 10 mm ball

The King PORTABLE BRINELL is guaranteed to make Brinell tests of the greatest accuracy on large and small parts of almost any shape. In addition, this versatile unit:

- can be carried anywhere to make tests or can be used as a bench tester
- can be used in any position—even upside down
- **has a removable test head for testing parts of larger size**

Ask for the folder illustrating and describing the many additional advantages.

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Help Wanted

STEEL FOUNDRY SUPERINTENDENT

Experienced in all phases of steel foundry practice, using electric melting furnaces, making low alloys, carbon and high manganese castings in light and heavy sections, about 350 tons monthly capacity, located in Ohio.

Necessary to know squeezers, sand slinger and jolt molding, hand and blower core making, sand preparation and other equipment used in modern steel casting manufacturing.

For the right man who can demonstrate ability and progressiveness this could be the start to sure promotion.

In first letter give personal history, experience and starting salary expected.

Personal interview will be arranged for qualified applicants.

All replies will be held confidential.

BOX 596, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

ALUMINUM CASTING ENGINEER

If you are interested in joining a Chicago foundry organization that is ambitious, aggressive and definitely expanding its facilities, and if you have had experience in foundry engineering on aircraft quality aluminum castings, we would like to hear from you. Please submit a brief resume. Salary will depend upon qualifications. All replies will be held in strict confidence.

BOX 612, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

ENGINEERS AND DRAFTSMEN

Experienced in foundry equipment and layout. Send resume of experience, references and recent snapshot.

BOX 593, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

PRODUCT MANAGER

Person to handle sales program, set up and assist jobbers, and develop a direct mail and advertising program. Product group includes fine quality replacement wear parts for Shot Blast Equipment, Sandslingers, and other such foundry or metal cleaning equipment.

Position involves traveling. Person must be aggressive and proven in sales ability. Desired age: 25-40. Include a recent photograph. Write full details to:

BOX 609, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

METALLURGIST

A medium-sized progressive manufacturer of oil field equipment, located in a small city in central Ohio, needs metallurgist experienced in gray iron casting and foundry practice. All replies confidential. Write stating full qualifications and salary requirements. Address: Box 615, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GENERAL FOREMAN

Established manufacturer, Piedmont South Carolina needs general foreman for expanding foundry division. Age 35 or younger. College degree preferred. Thorough knowledge of cupola operations required. Must have wide foundry experience including gating, sand and molding in diversified small and medium jobbing and production. Salary open. Address: Box 634, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

SHELL MOLD SUPERVISOR

Must have considerable practical experience in all phases of shell molding as an operator and a supervisor. Will accept man with working experience in place of technical background. To head new department in foundry in Chicago area. Excellent starting salary, good advancement potentials. Give age, salary requirement, complete resume of experience and past employment. All replies confidential.

BOX 647, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

W A N T E D

By eastern electric steel foundry, salesman, sales engineer, or junior sales executive capable of assuming responsibilities and duties of sales manager within five years. Must have practical knowledge of steel foundry operations. Preferred age 35-45. Submit detailed resume with reply.

BOX 637, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

PLANT SUPERINTENDENT

Malleable iron foundry producing light and heavy castings needs man experienced in all phases of foundry operations. Good opportunity for right man. In replying give full particulars and experience in first letter. Replies confidential.

BOX 638, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

TIME STUDY ENGINEER

Large, nonferrous foundry needs man with foundry time study experience. Must be completely familiar with latest foundry techniques and methods. Must have supervisory experience. Send complete resume and salary requirements.

BOX 655, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

METALLURGIST

Mechanical foundry seeks metallurgist experienced in duplex malleable iron. To take complete charge of melting operations. Submit experience, age and salary desired. All replies held confidential.

BOX 648, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

METALLURGIST

Steel Foundry in East desires services of graduate metallurgist with some experience in acid and basic melting procedures and sand control. Please give full particulars regarding background and salary desired in first letter. Address: Box 632, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

NONFERROUS FOUNDRY SUPERINTENDENT

Experienced in all phases of producing quality aluminum and bronze castings. Needed by medium-size jobbing foundry in Northern Ohio. Please give complete history and salary expected in letter. Address: Box 656, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

HELP WANTED

The following positions are available for the right personnel in a long established northwest foundry producing steel castings:

1. WELDING ENGINEER AND ASSISTANT CLEANING DEPARTMENT FOREMAN. Must be thoroughly versed in all procedures for preparation of and welding steel castings.

2. ASSISTANT CHIEF INSPECTOR. Applicant must have thorough knowledge of foundry operation as well as knowledge of quality standards for steel castings.

3. ASSISTANT FOUNDRY ENGINEER. This job consists of the layout and engineering of gating and risering systems for steel castings and following same through production.

All three jobs offer excellent future opportunity for the proper personnel.

BOX 617, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY FOREMAN

To supervise iron, steel and brass foundries. Large Copper Company Chile, South America. 3 year contract. Transportation both ways and salary while traveling paid by Company. Good opportunities. In reply give complete details.

BOX 631, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

WANTED
PATTERNMAKER

Thoroughly experienced in wood patternmaking. Mechanized Steel Foundry located on West Coast. Salary equal to Los Angeles area pay scale. Excellent working conditions. Write full particulars in strict confidence.

BOX 639, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY SUPERINTENDENT

Gray iron foundry in Great Lakes area producing light to heavy castings seeks man experienced in all phases of foundry operation. Good opportunity for right man. Give complete data in first letter including complete work history, references, age and when available. All replies confidential.

BOX 661, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

SALES METALLURGIST
PRECISION CASTINGS

Prominent manufacturer of high quality precision castings, ferrous and nonferrous, has need of capable, aggressive sales engineer. Should have a metallurgical background and be familiar with needs of industry in the precision casting field. Should be able to initiate sales policies and promotion of new ideas in this industry. Good possibilities for advancement to Sales Manager and beyond for right man. Salary commensurate with experience and ability. Midwest location. Please forward resume. Address: Box 644, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

For medium-sized gray iron non-mechanized production foundry in Minnesota. Must be thoroughly experienced in all phases of foundry techniques and production methods. Excellent future for experienced man capable of handling personnel. Preferred age 35-45 years. Send personal description, experience, history, references and salary requirements. Address: Box 653, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Foundry Supervisor gray iron and steel background. Job shop experience. Chicago area. Address: Box 640, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Help Wanted

FOUNDRY METALLURGIST

To take charge of all foundry operations of investment (precision) casting company. Applicant should have experience with ferrous and nonferrous alloys and, if possible, with high vacuum techniques. Should also be capable of initiating alloy development programs. Salary commensurate with ability and experience. Midwest location. Please forward resume. Address: Box 643, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GRINDING FOREMAN

Midwest foundry. State qualifications, references, and salary. Address: Box 598, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

EXECUTIVE

Experienced in all phases of foundry operations and management. Thorough knowledge of machine shop, pattern shop, engineering, metallurgy, foundry cost and estimating, sales and industrial relations. Registered mechanical engineer, 25 years' experience foreman, superintendent, general manager and vice president. Foundry running 150 tons daily. Address: Box 628, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT OR MANAGER

Twenty-eight years' practical experience ferrous and nonferrous, jobbing and production. Fully qualified to take complete charge all foundry operations. Iron by analysis, high and low carbons. Have held supervisory positions past 18 years, last 13 as superintendent. Age 46. Now employed. Excellent reasons for desiring change. New York State preferred. Complete data education and experience upon request. Address: Box 651, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

INDUSTRIAL ENGINEER

Thorough knowledge of practical foundry operations, methods, equipment and layout. Have set up production control department, standard department, incentive system and pricing system. Address: Box 594, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES ENGINEER

Mechanical Engineer, with experience in all phases of foundry operations through supervisory and development engineering positions, desire entry into sales engineering field. Address: Box 659, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGIST

Four years' experience in gray iron as melting supervisor, sand control and quality control. Degree, B.S. in Metallurgical Engineering. Age 33. Desire position of responsibility offering opportunity for advancement. Address: Box 600, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Thoroughly experienced in the management of gray iron production or jobbing foundries. Qualified to show you a highly efficient and low cost operation. If you are interested, Address: Box 556, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Position in gray iron or nonferrous. Thirty years' experience, practical and technical. Well versed in all departments, medium-sized jobbing or production. Presently employed as superintendent. Address: Box 663, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Employment Service

FOUNDRY PERSONNEL SPECIALISTS
National Placement and Procurement of
GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS,
Confidential Inquiries Invited
From Employers and Qualified Applicants.
For Fast Competent Assistance Contact

DRAKE PERSONNEL, INC. **HARRISON 7-8600**
JOHN COPE, DIRECTOR **220 SOUTH STATE ST., CHICAGO, ILL.**

Positions Wanted

FOREMAN OR SUPERINTENDENT

Thirty-three years' practical experience, 20 years as supervisor in both jobbing and high production shops. Experienced in rigging and gating for fast production and quality castings, both gray iron and nonferrous metals. Addess: Box 588, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY FOREMAN

Twenty-nine years' foundry exeperience, past sixteen in supervisory capacity. Can handle coreroom and molding floor. Cost conscious, good labor relations, high production caliber. Will relocate anywhere. Address: Box 573, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MELTING SUPERINTENDENT

Graduate Metallurgist, varied experience, but primarily in stainless steel melting for all types of foundry molding. Presently employed. Address: Box 635, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGICAL ENGINEER

BS Degree, age 34, married, family. Thirteen years diversified production and process development supervisory experience in founding of light alloys, specializing in plaster mold, precision and high quality complex castings. Seek responsible position with progressive foundry organization. Presently employed. Address: Box 657, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FERROUS FOUNDRY FOREMAN

Diversified, competent, capable, 28 years' practical experience. Thoroughly familiar with cast iron production line methods. Address: Box 652, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY ENGINEER

Seven years' experience in ferrous and nonferrous foundry operations and engineering, including research and development. Mechanical engineer, desire supervisory position in production or development, with advancement opportunity. Address: Box 660, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY ENGINEER

Want permanent position in the Kansas City or St. Louis area. Twenty-five years' experience in the engineering, maintenance and design of gray iron malleable and brass foundry facilities. Familiar with all phases of foundry operations from raw materials to finished castings. Also qualified to prepare comprehensive plant survey reports, with plant layouts, specifications and estimates on future proposed modernization, mechanization or automation programs. Address: Box 599, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGIST

Twenty-four years' experience production and control of plain and alloyed gray iron, heat and corrosion resistant alloys, cupola and electric melting, heat treating, sand control, chemical and physical testing. Employed. Address: Box 654, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundry Consultant

NONFERROUS PROBLEMS AND QUESTIONS
A complete consulting service all phases—by letter or tape recordings. From simple defect analysis to a complete foundry or process, including foundry smelting. Also special instruction tapes all departments. Reasonable cost. Inquire. Address: Box 646, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representatives Wanted

WANTED

Salesman, metallurgical specialties to foundry and allied industries. Territories of Wisconsin, Illinois, Eastern Indiana and vicinity. Foundry experience preferred.

BOX 650, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

SALES REPRESENTATIVE

Large malleable foundry seeks sales representation in Georgia, Alabama and Tennessee on commission basis. Send particulars.

BOX 641, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

AGENTS

To sell replacement wear parts for Sandslingers, parts to fit "Wheelabrator" Shot Blast Equipment, and for similar wear applications. Product group is already established and accepted. Need agents familiar with foundry and metal cleaning industry. Attractive commission arrangement. No inventory. Openings in South and Mid-West.

SPECIAL PRODUCTS DIVISION
LATROBE STEEL COMPANY
LATROBE, PENNSYLVANIA

SALES REPRESENTATIVE

For a well established nonferrous alloy company. We make such alloys as Copper Shot, 50/50 Copper Nickel Shot, Manganese Copper, Aluminum Bronze Hardeners, Manganese Bronze Hardeners, Deoxidizers and Degasifiers, 5% Titanium Aluminum, Silicon Aluminum, Manganese Aluminum and many similar alloys. We have excellent territories open with active accounts. Our plant is located in the Buffalo, New York area. Address: Box 584, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES REPRESENTATIVE

Rochester N. Y. Organization wants sales representative for aluminum castings in Ohio, Pennsylvania, Detroit and Eastern U. S. A. Working knowledge of metals desirable. State sales qualifications in letter and Address: Box 642, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALESMEN

We want several live-wire salesmen who are now working on salary and who think they could increase their earnings by selling on liberal commission. These men must have followings in industries buying master alloys and hardeners. Please give full details in your first letter, i.e., personal history, employment record, territory, etc. Your information will be held in strictest confidence. Address: Box 665, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

OPPORTUNITY

With active established Foundry Supply firm, for aggressive young man with ability to formulate and help sell a top quality line of Binders, Washes, Ladle Lining Paste, Parting, etc. Profit sharing basis available. Address: Box 666, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Opportunity

FOUNDRY OPPORTUNITY

Will sell interest in business which now operates one foundry and takes entire output of two others, unlimited orders on hand. Approximately one million per year sales. Net worth about $400,000. Will sell interest to able executive with foundry knowledge at reasonable figure and on terms. We do not need capital but want to insure incentive. Owner wishes to have more leisure time and good man could easily take over majority ownership within a few years out of profit. Business established in 1930. Headquarters in Indiana. Minimum investment about $25,000. Starting salary around $175.00 per week plus share in profits.

BOX 658, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

Wanted-To-Buy

WANTED TO BUY

Sutter Automatic Shell Core and Shell Mold Blowing machine, maximum weight of core 20#.

"Gee" Shell Core and Shell Mold machine, similar to their Model SC-1418.

Shell Bonding fixture, as made by Shell Process, Inc., table 18" x 30", maximum mold height 16".

BOX 636, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

WANTED TO BUY

Detroit Electric Melting Furnace 1000-1500 pound capacity. Please furnish data. (Serial number of furnace as well as primary voltage on transformers etc., as well as price.)

BOX 629, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

WANTED

1—50 to 100 KW INDUCTION MELTING FURNACE. WILL CONSIDER BUYING M.G. SET.

EASTERN MACHINE PRODUCTS
OLEY, PENNSYLVANIA

WANTED TO BUY

1—#80 B & P Speedmuller. State auxiliary equipment available, serial number and price.

BOX 664, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

MACHINERY WANTED

Screens, Simpson Mixers, Riehle Compression Testing Machines, Pulverizers, Grinders, Conveyors. Address: INSTRUMENT SERVICE COMPANY, INC., HOBOKEN, NEW JERSEY. BA 7-0600.

WANTED

Gray Iron Foundry located in Ohio interested in producing C.I. Watermain Fittings from Production Metal Cope and Drag Plates. Address: Box 633, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED TO BUY

1—Used Herman Pneumatic bumper with 12" diameter cylinder. Please

NATIONAL PLUMBING FIXTURE CORP.
P. O. BOX 831
ELLWOOD CITY, PA.

Foundry For Sale

FOUNDRY FOR SALE

Gray iron foundry in East Central State. 24,500 sq. ft. Six acres of land on railroad. Concrete block and steel construction. Recently modernized. Overhead cranes. Capacity 15/20 tons per day.

BOX 649, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

SMALL FOUNDRY FOR SALE

Well-equipped foundry in Eastern Pennsylvania. Has overhead crane, cleaning equipment. Plenty of adjacent land. On railroad. Address: Box 572, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY FOR SALE

Established going gray iron foundry in Central Wisconsin. Fully equipped; manufacturing own line and general jobbing. Capacity up to ten tons per day. Over $70,000 value. Can be purchased for less than half. Principals only. Terms. Address: Box 662, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

For Sale

NEVER USED
PERFECT CONDITION
SANDSLINGER EQUIPMENT

Beardsley Piper Stationary Sandslinger, double belt type, Serial S-676-5403, 5'0" First arm, 4'0" Rowing unit, 19" Diameter Impeller Head, 4" tip, 220 volt, two speed 16/25 H.P. 1200/1800 RPM Rowing Motor. Floodlight.

Beardsley Piper 8-Ton Roto-Feed, 5 H.P. Totally enclosed, fan-cooled, high torque, 55° C rise continuous duty motor. Serial #F-334-5403.

Model 920 RCX, Johnston & Jennings Rol-A-Draw Molding Machine, 2000# capacity, Pattern Draw 20". Serial JJM-238-5403.

30' Link Belt Bucket Elevator, outside 48" x 24", inside 42" x 17¾", Bucket size 12" x 7" x 7¼", new bearings, Motor and gear drive overhauled. Excellent condition.

WHY WAIT FOR DELIVERY WHEN YOU CAN HAVE IMMEDIATE SHIPMENT.

BOX 630, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FIRST CLASS EQUIPMENT AT BARGAIN PRICES

CORE BLOWERS

Osborn—Model 91, 193, and 94
Redford—Bench type—with clamps $150.00

GRINDERS

U. S. 7½ HP 3 speed 28" wheel $500.00
Marschke 10 HP, Swing Frame

MOLDING MACHINES—JOLT, SQUEEZE, STRIP

Osborn, 724 & 726 PJ, 4000 lb.
Milwaukee, 143, 163, and 183, 1500 lb.
Nicholls, Type D, 1500 lbs.

MOLDING MACHINES—JOLT SQUEEZE

Osborn, #275
Spo, Model 110 J
Nicholls, Type B

MOLDING MACHINES—JOLT ROLLOVER

International—Type G Size 30 x 12
International—Type F Size 31 x 12
International—Type RES
Spo—Model 506
Tabor—30" Shockless type
Osborn—#601, 602, and 605
Osborn—#2047-4

MISCELLANEOUS

Beardsley & Piper—#50 Sandmixer
Climax Wire Straightener—#2
Beardsley & Piper Screenerators—Model S
2000 lb. Fisher & Strohman Tilting Melting Furnaces
Dielectric Core Ovens

FOR THE BEST DEAL CALL
BALCHER MACHINERY COMPANY
6020 EUCLID AVENUE
CLEVELAND 3, OHIO
TELEPHONE: EXPRESS 1-8930

For Sale

FOR SALE

MOLDING MACHINES

1—Herman, Jolt, Rollover Draw, 6000#, 40" x 60" table.
2—International, Jolt, Rollover Draw, 24" x 10G, Stationary.
2—International, Jolt, Rollover Draw, 20" x 8-G, Portable.
1—SPO #305 Jolt Stripper.
2—No. 275 Osborn jolt squeezers.

CORE OVENS

1—Coleman Recirculating 3 section with 5 drawers per section. Gas fired.
1—Coleman Recirculating 4 section with 5 drawers per section. Gas fired.

BLOWERS FOR CUPOLAS AND FURNACES

1—Connersville Rotary Blower, 3500 CFM.
2—#7½ Roots rotary blowers—27 x 81—14000 CFM.
2—Connersville Rotary 14" x 27" HD, 2750 CFM at 5# press.
1—Connersville rotary blower 22 x 66 45 cu ft. per revolution 9000 CFM.

Maxon-Premix Blowers for Gas ¼ to 1 HP.

2—5 HP 20-oz. Spencer Turbine Blowers.
2—2 HP 20-oz. Spencer Turbine Blowers.

METAL MELTING EQUIPMENT

1—1000# open flame brass melting furnace, gas fired.
1—Hausfeld Stationary Brass, oil or gas burner, 200# cap.
1—Hausfeld Tilting crucible, gas, 250# Al, Cap.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.

MISCELLANEOUS

1—Beardsley & Piper Model S Screenerator.
1—Pangborn 1 to 4 nozzle air blast generator, complete.
1—Sullivan, 2 stage compressor, 14-8¾ x 10, 75 HP.
1—Sly Tumbler 24" x 40".
1—International SB-11 core blower.
2—Pangborn cloth screen collectors, 2 HP.
1—Stoney crane type shakeout.
1—NC-4 Royer sand separator.
1—#1 Demmler core blower.
1—#16 Roto-clone unit complete.
Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

FOR SALE

1—Tinius Olsen 100,000# Universal Compression Testing Machine
1—Magnaflux Demagnetizing Unit
Simpson Sand Mixers 18" dia. Laboratory #0, #1, #1½, #2, #3.
Miscellaneous: Screens, Pulverizers, Grinders, Conveyors—all types, Tyler Rotap Screens, etc.

OUR 38th YEAR

CONSOLIDATED PRODUCTS CO., INC.
66 BLOOMFIELD STREET
HOBOKEN, NEW JERSEY
HO 3-4425 N.Y. TEL. BA 7-0600

FOR SALE

Heller Universal type 26" cold saw, excellent condition, used little, complete. Wired 220/3/60. Includes Heller automatic saw sharpener and ten saws.

BOX 606, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

CLASSIFIED ADVERTISING

For Sale

FOR SALE

1 Roots Rotary Positive Blower, 20x44 type HD Serial 11279
1 AC 40 HP 700 rpm motor for same
1 Air Filter
1 Square D Switch
1 Hand Starting GE Compensator
1 #7 Whiting Cupola

1 lot of various steel chains for use with cranes

Following air hoists, 4000# capacity Serial A-19548, 6000# A-32371, 4000# A-29042, 4000# A-23787, 1000# 27136, all Ingersoll-Rand, 6000# A-13676, 6000# A-211401, 4000# 163004, 10,000# 114, all Chicago Pneumatic.

4 Exhaust fans 30 to 48" blades with louvres and motors.
One lot of assorted core plates, large and small

1 Whiting Charging Crane with Cone type bucket.

PYOTT FOUNDRY & MACHINE CO.
328 N. SANGAMON STREET
CHICAGO, ILLINOIS
MONROE 6-0295

FOR SALE

One—36 x 42 Shot Blast Barrel Cleaning Machine and dust collector, 1954	$2800.00
One—Demmler Model #55 Core Blower	200.00
One—4000 Gal. Oil Tank as new	450.00
One—240 Gal. Air Tank extra heavy	75.00
Two—Small Tabor rollovers, each	125.00
Six Station Overhead Sand Unit Complete, air operated gates and plows, never used	8000.00
One—Rotary Two Ton Furnace for melting steel, iron and malleables; one of the finest furnaces in its class	4800.00
50'—Fleximont Link Assembly Conveyor, run six months	700.00

BAMBER FOUNDRY, INC.
MARKET STREET
STAMFORD, CONNECTICUT

FOR SALE

TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
6000	32oz.	Ing.-Rand	380	16oz.	No. Am.
4700	32oz.	Ing.-Rand	340	20oz.	A-B
2700	16oz.	Spencer	320	12oz.	Spencer
2500	7oz.	Sturt.	140	32oz.	Hoffman
1150	20oz.	No. Am.	9000	6"SP	Northern
800	13oz.	Buffalo	3420	8"SP	N.Y.
525	48oz.	Ing.-Rand	2500	½"SP	American
500	12 oz.	Buffalo	2344	2"SP	Clarage
			1100	4½"SP	Bayley

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

FOR SALE

Heavy Duty Craneway 20 Pcs. 14" x 14" heavy section columns 29'6" long. 20 Pcs. 20" x 12" heavy section beams 20'0" long all knee braced. Will make 180' long craneway with 2 extra beams. Craneway bolted construction and has been protected by paint. Contact: **C. L. MECHLING, PURCHASING AGENT, DODGE MANUFACTURING CORP., MISHAWAKA, INDIANA.**

MOTORS — GENERATORS
TRANSFORMERS
Unused — Rebuilt
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT COMPANY
Phone Station Collect GLenwood 6783
P. O. Box 51 — Rochester 1, New York

FOR SALE

Wire Straightener and cutter, Lewis Machine Co. Serial No. 7 D 131, capacity $\frac{1}{16}$ to $\frac{3}{16}$", equipped with 220-440 Volt motor and Moslo Reel. Beardsley & Piper No. 3½ Mulbaro, 3 Ph. 60 Cy. 220V. 1740 RPM motor, 1-36" wheelbarrow with rubber tires, manual starter, including wiring.

WISCONSIN GREY IRON FOUNDRY CO.
2566 NORTH CAMBRIDGE AVENUE
MILWAUKEE 11, WISCONSIN

For Sale

WE—BUY—SELL—TRADE

15" Continuous Wheelabrator	$4,500.00
36 x 42 Wheelabrator	3,000.00
27 x 36 Wheelabrator (Iron Belt)	2,500.00
Pangborn ES 421 Shell Blasting Machine (Like New)	3,500.00
Vapor Blasting Machine	750.00

Pangborn CK 220 Dust Collector
Also Pressure Tanks, elevators, blowers, Motors all types and sizes.

ATTENTION CANADIAN BUYERS

We still have 2—42 x 48 Wheelabrators in Canada. These can be purchased Duty Free. Priced at $2,500.00 and $3,000.00. Excellent Condition. Also 42 x 48 wheelabrators in Detroit at $950.00 and $1,500.00.

DIAMOND SAND BLAST INC.
5654 WEST JEFFERSON AVENUE
DETROIT 9, MICHIGAN
PHONE VINEWOOD 3-6750

STEEL MELTING FURNACES

One 350 lb. cold charge. Never used. One 60 lb cold charge. Slightly used. One 17 lb. Model PT. Slightly used. All furnaces Detroit Rocker Indirect Arc with spare shells. Complete with meter panels, switches, and transformers. All wired for 220-volt 60-cycle. Will sell or trade for M. G. Induction unit.

FALLON INDUSTRIES
25800 GROESBECK HIGHWAY
ROSEVILLE, MICHIGAN
PH: PRESCOTT 7-2500

FOR SALE

Beardsley & Piper Stationary Sandslinger, Complete Unit with 5 ton Plate Feeder and Hopper, Rotary Turntable, Conveyors, etc. Motors 220-440 volt AC, 3 phase, 60 cycle. Equipment requires little headroom and is absolutely one of the finest and most versatile units in this country. Excellent condition and will gladly demonstrate.

STARK FOUNDRY COMPANY
P.O. BOX 147, STATION A
CANTON 5, OHIO

FOR SALE

21" Cope and Drag machine team

Milwaukee #217 jolt, squeeze, rollover, draw, molding machine. 21" squeeze cylinder, 12" draw.

Milwaukee #214 car type, jolt, squeeze, strip, molding machine. 21" squeeze. 10" draw.

To be sold as a pair for $6000.00. Good condition, can be seen in operation.

SLINGER FOUNDRY COMPANY
SLINGER, WISCONSIN

FOR SALE
COMPLETE—LIKE NEW—IMMEDIATE DELIVERY

G. E. ROLLER HEARTH 850 KW—1650 deg. F. 5' wide, 18" high, 35' long—80' cooling.
G. E. ROLLER HEARTH 465 KW—1650 deg. F. 5' wide, 18" high, 20' long—40' cooling.
G. E. PUSHER 240 KW—1650 deg. F. 5' wide, 24" high, 22' long—Quench Conveyor.
4000 CFH EXO GENERATOR with each above furnace.
YOUNG BROS. GAS RECIRC. CONVEYOR BELT—1000 deg. F. 8' wide, 24" high, 45' long. NEW.
UDYLITE DIPPING MACHINE, 1-12 Station Rotary Type.
UDYLITE 1-14 Station Rotary Zinc Plating Unit.
DRYING SYSTEM OVEN 450 deg. F—13' W, 7' H, 64' L.
DRYING SYSTEM OVEN 150 deg. F—10' W, 9' H, 52' L.
500 CFH Westinghouse Endothermic Generator.
SURF. COMB. GAS BOX 30" W, 18" H, 36" L. 1800 deg. F.
MARSHALL BLOW PIPE VENT HOOD.

PAPESCH & KOLSTAD, INC.
10707 CAPITAL AVE.
OAK PARK (DETROIT 37) MICH.
LINCOLN 11100.

FOR SALE

ONE SPECIAL NEWAYGO REDDY SANDY USED ONLY TWO YEARS

HAYS MFG. CO.
12TH & LIBERTY STS.
ERIE 6, PENNSYLVANIA

For Sale

FOR SALE

Wheelabrator Tumblast 48" x 48", complete with loader dust collector	$6000.00
Wheelabrator Tumblast, 36" x 42"	3000.00
Wheelabrator Cabinets 35' x 12' pipe cleaning	2750.00
Wheelabrator Table No. 1	1000.00
23—Osborn 2047-4 Jolt Rollover Molding Machine, 18" x 24" table, 8½ draw, unused	200.00
19—Tabor 10" Power Squeeze	100.00
Tabor #22 Hydraulic Jolt Rollover Table, 22" x 42", 10" draw	750.00
Berkshire 10" Jolt Squeeze	225.00
Gehnrich 5' x 4' x 5' core oven	200.00
Gehnrich 10' x 9' x 10' core oven with controls	600.00
Ross & Federal Core Draw Vibrating Machines	75.00
Spencer Turbo Blowers 16 oz. 800 CFM 5 HP motor	250.00
Blower 90 CFM 16 oz. North American unused	150.00
Gogan Brinell Hardness Tester, motorized	450.00
American Dustube No. 185, 16650 CFM. 25 HP motor and blower	1750.00
Rotoclone sludge type, 2500 CFM with 5 HP motor and blower	750.00
American Dustube #35, blower and motor	300.00

M. ELSTEIN
426 GRAND STREET
JERSEY CITY 2, NEW JERSEY

FOR SALE

American Wheelabrator, swing table 86" diameter, complete with motors and control panel. Practically new.

Reda #550 series combination oil fired-hydraulic tilting furnace, with tank.

Beardsley & Piper motive type sand slinger 19" head adjustable liner—6'0" arm, 11'0" conveyor arm, 12'0" on center bucket elevator, 31 buckets.

PYOTT FOUNDRY AND MACHINE CO.
328 NORTH SANGAMON STREET
CHICAGO 7, ILLINOIS

FOR QUICK SALE

Coleman 36 foot tower oven, 28 carries 24 x 72 three shelves each. Combination gas oil burner. Also 65 foot slider belt core conveyor. All near new condition used only one year.

Priced right for quick sale.

THE KENNEDY VALVE MFG. CO.
ELMIRA, NEW YORK

FOR SALE

MOLDING MACHINE, Herman, 6000 lbs. capacity jolt, roll, draw, 42" x 78" table, 43½" draw, in good operating condition. Located in Eastern Pennsylvania. A bargain, no dealer involved. Address: Box 645, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE

72—24 x 2 x 2 37C-16 S5V Norton grinding wheels
48—24 x 1½ x 2 37C-16 S5V Norton grinding wheels
1—24 x 3½ x 2 37C-16 S5V Norton grinding wheel

Surplus stock. Make offer.

OHIO MALLEABLE DIVISION
The Dayton Malleable Iron Co.
COLUMBUS 16, OHIO

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

FOR SALE

Forty heavy steel buckets with overhead bale and locking device. 26" diameter x 32" high. Address: AMERICAN MALLEABLE CASTINGS COMPANY, BOX 514, MARION, OHIO.

WE'RE NOT SLOWING DOWN THIS SUMMER!

UNIVERSAL is bringing prices down to the rock bottom to keep up our high volume during the vacation months. Get our quotations and be surprised at how economically you can make necessary changes with . . .

UNCONDITIONALLY GUARANTEED EQUIPMENT REBUILT BY UNIVERSAL

AIR COMPRESSORS

1—40 HP SULLIVAN, Model B-Bim #8, WL 60 w/Receiver.

BLOWERS

1—85 HP G.E. Cupola Blower, 24 oz.
3—7½ HP FISHER, 16 oz.
15—CENTRIFUGAL BLOWERS, 350 CFM to 10,500 CFM.

CLEANING EQUIPMENT

1—AMERICAN #1 MULTITABLE, 6 aux. tables 15", main table 45".
1—ROBBINS SHAKEOUT, 4' x 2'.
1—AMERICAN WHEELABRATOR 72" SWING TABLE with Elevator; installed 1953; used 2 months.
1—PANGBORN #3½ GK ROTOBLAST.
1—AMERICAN #2 MULTITABLE, 5 tables, 37" dia.
2—SIMPLICITY SHAKEOUTS, 4' x 6'.
1—LINK BELT SHAKEOUT, 5' x 8', 5 HP Motor.
5—US GRINDERS, double end, 10, 15, 20 HP.
4—GRINDERS, Swing frame, 15 HP.
2—TUMBLING BARRELS, Cast Iron, 36" x 24" w/2 HP Motor.
2—TUMBLING BARRELS, Square, 34" x 48".
2—TUMBLING BARRELS, Side Tilt, 18" wide x 20" deep.
3—TABOR CUT-OFF Saws, 5 & 10 HP.

CONVEYORS

4—SAND ELEVATORS, various sizes.
1—STEEL PLATE MOLD, 90' centers, 30" belt, w/drive.
2—STEEL PLATE MOLD, 90' centers, 24" belt, w/drive.
6—SAND BELT CONVEYORS, 10' centers to 140' centers, 18" to 36" belt, complete w/drives and hoppers.
2—CASTING CONVEYORS, wire mesh, 18" x 32" w/drive.
FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES—SEND REQUIREMENTS

CUPOLAS

1—WHITING, #4, with skip charger motor and blower.
1—WHITING # 6, Complete.
1—WHITING #7.
1—MORRIS #9, w/skip, mixing ladle, never used.
1—WHITING #3½, w/Blower & Air weight Control.
1—WHITING #5, w/Blower & Air weight Control.
1—MODERN, #3, 46' shell, w/blower.
1—SKIP CHARGER, 3 bottom drop buckets, blower, motor, and scale for #9 Cupola.

CORE BLOWERS

1—CB-400 CHAMPION. 1—3K DEMMLER.
1—#55 DEMMLER. 1—#92 OSBORN.
1—FEDERAL, San-Blo.
1—SB 13 INTL.

FLASKS & CORE PLATES

400 TONS, CAST STEEL, STRUCTURAL STEEL and STERLING TYPE FLOOR FLASKS—ALL SIZES.

20 TONS, FLAT STEEL and PERFORATED STEEL CORE PLATES.
SEND FOR COMPLETE LISTINGS.

FURNACES—DIRECT ARC MELTING

1—150#/hr. "LECTROMELT".
1—250#/hr. Hydraulic Top Charge.
1—500#/hr. MOORE.
1—1 Ton WHITING Top charge.
1—2 Ton SWINDELL, Top charge.
1—1000# SWINDELL.
1—2 Ton WHITING top charge.
2—3000# HEROULTS.
1—2 Ton HEROULT.
1—6 Ton HEROULT.
Several 3 Ton to 10 Ton capacity Side and Top Charge Furnaces.

FURNACES—DETROIT "ROCKING"

2—200# cap. DETROIT, complete.
3—350# cap. DETROIT, complete.
1—1000# cap. DETROIT, complete.
1—3000# cap. DETROIT, less transformer.
1—1500# DETROIT, Complete.
1—60# DETROIT, Complete.

FURNACES—INDUCTION MELTING

1—20 KW AJAX Spark Gap High Frequency, 17 lb. capacity in steel.
1—25 KW AJAX HIGH FREQUENCY M. G. SET with CONTROLS, 50# CAP.
2—60 KW, AJAX-TAMA-WYATT, Alum.
1—80 KW, GE, 9600 Cy., MG Set.
3—333 KW, AJAX-TAMA-WYATT, 1500# Alum.
1—175 KW, 960 CY., MG Set, 1000# Cruc.
1—166 KW, AJAX, 60 Cy., Alum.

FURNACES—OIL AND GAS

1—HAUSFELD Tilting #675, 250 cruc. Oil.
1—FISHER 4 Burner MNP, 1700#, gas.
3—WALKER YORK #400 cruc. tilting, coke fired.
1—SKLENAR 600#, Oil fired.
7—HAUSFELD 1000#, tilting, oil fired.
1—HAUSFELD Tilting, 1200# Mag.
3—MONARCH Oil Fired Stat., #60 cruc.
1—R & S Convection Draw, Car bottom, 18' l x 8' w x 5' h, oil fired, dismantled, controls.

LADLES & POURING DEVICES

2—6 TON TEAPOT, Worm Geared.
2—WHITING 3 Ton, Bottom pour.
3—MODERN #F-9 POURING DEVICES.
4—10 TON BOTTOM POUR, 55" x 55".
2—15 TON BOTTOM POUR, 65" x 59".
2—45 TON TREADWELL, Excellent.
1—20 Ton lip Pour, 72" x 72".
1—SWINDELL, Elec. Holding.

MOLDING MACHINES

1—SHELL-O-MATIC Shell Molding Machine.
2—HERMAN ROLLOVERS, 26 x 30", 750#.
1—HERMAN ROLLOVER, 1500#.
1—SPO Port, Jolt Rollover, #506-1.
8—OSBORN #275J Jolt Squeezers.
2—SPO #110J Jolt Squeezers.
5—MILWAUKEE Jolt Pin Lift 32" x 38".
2—MILWAUKEE Jolt Squeeze Strippers, #163.
1—J & J #612 Port. Rollover, 24" x 30".
1—J & J #815-B Rollover.
3—INTERNATIONAL "G", 24" x 10" Jolt Rollovers.
5—OSBORN Jolt Rollovers, Hand Draw, #142.
3—TABOR Jolt Squeeze in Head.
1—OSBORN #243 Jolt Rollover.
1—OSBORN #559 Jolt Stripper, 25" x 30".
1—DAVENPORT 28SA, 28" x 40".
3—HERMAN Rollover & Jar, 6000#, 60" x 80".
2—HERMAN JOLT ROLLOVERS, 3000#.
11—DAVENPORT #30-T Jolt Strippers.
2—TABOR POWER ROLLOVERS, #2242 w/clamps, late.
1—TABOR Jolt Stripper, 20" x 20", 4" draw.
2—TABOR ROLLOVERS, 30" x 40".
1—SPO, 9336, Jolt Clamp rollover draw.

MULLERS AND MIXERS

2—SIMPSON #3, enclosed gears.
2—SIMPSON #2, Unit Drive.
2—CLEARFIELD #610 and #920.
1—BEARDSLEY & PIPER #60 SPEEDMULLER, 60 HP motor, SKIPLOADER.

OVENS

1—TOWER CORE OVEN, 14" x 60" trays, 45' high, Gas fired, dismantled.
2—ROSS 2 comp., rack, gas, 6½ x 14 x 7.
1—CRAWFORD, Gas Fired, 3 drawers.
1—HOTPOINT EDISON, ELECTRIC, 6 drawers, 30" x 40" x 8".
1—YOUNG BROS. 3 compartment, kiln type tlectrically heated, with CONTROLS.
1—YOUNG BROS. 2 compartment, drawer type, oil or gas, 82" h x 12' w x 6' l.

SAND CUTTERS

5—AMERICAN SAND CUTTERS—
1—MODEL "AA", 60" reel, Gas Driven.
1—MODEL "K", 72" reel, Gas Driven.
1—MODEL "F", 80" reel, Gas Driven.
1—MODEL "D", 76" x 96".
1—SANDMASTER, 70/102, New in 1950, Rubber Tires.

SAND LABORATORY EQUIPMENT

1—TEST CORE BAKING OVEN #606.

SAND PREPARATORS

1—REDDY SAND UNIT. HANDY SANDY.
2—JEFFREY SANDITIONERS, Portable.
1—SCREENERATOR "M".
2—ROYER SAND BLENDERS, 16" belt, 12" belt.
1—LINK BELT REVIVIFIER, Size 5.
2—B & P SAND CONDITIONERS, portable.
1—HETHERINGTON & BERNER SAND DRYER, rotary, oil fired, #552.

SAND SLINGERS

1—BEARDSLEY & PIPER MOTIVE JR. 19" head.
1—BEARDSLEY & PIPER TRACTOR TYPE 16" head, magnetic separator.
1—PORTABLE SLINGER, 16" head, 4' long, on Truck.

TESTING MACHINES

1—TINIUS OLSEN, UNIVERSAL, 100,000# capacity.
1—TINIUS OLSEN, BRINELL HARDNESS, 3,000 KG.
1—RIEHLE, UNIVERSAL, 2 screw mechanical, 100,000# capacity.
1—RIEHLE, BRINELL HARDNESS, hydraulic, 3,000 KG.
1—ROCKWELL HARDNESS, #5JR with "C" Brail.
1—BALDWIN - TATE - EMERY, UNIVERSAL, Hydraulic tensile, 24,000#.

TRUCKS

1—CLARK, FORK LIFT, 108" lift, Gas.
2—HOUGH PAYLOADERS, Model HA, Hydraulic Trip.
Outside Yard Crane Runway, 2-5 Ton Cranes, 50' span, 400' long.

IN ADDITION: We are now liquidating several large foundries. Send your requirements today. We'll fill them!

UNIVERSAL MACHINERY AND EQUIPMENT CO.

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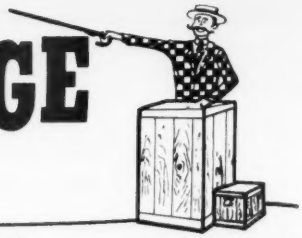
Shillington, Reading, Pa.

THE ACME BARGAIN PAGE



AIR COMPRESSORS

Chicago Pneumatic 50 HP direct motor driven Type P-4.

Chicago Pneumatic 2 stage horizontal 24″ x 14″ x 18″. 3600 CFM 800 HP 2200V. Synchronous motor, M.G. set, Intercooler, Aftercooler and starting panel.
Ingersoll-Rand 1200 CFM, XB. Imperial 2 stage 22″ x 13″ x 16″, Intercooler, Aftercooler, 200 HP 220V.
Ingersoll-Rand 800 CFM. Imperial type 10-2 stage 18″ x 11″ x 16″, 170 HP 220V motor starting compensator.

BLOWERS

Ingersoll-Rand Motor Blower Type FS. Single Stage 4000 CFM @ 3.75 PSI, 100 HP, 220V G. E. Induction motor.
General Electric 7500 CFM, 20 oz., 89.6 Max. HP, 220V motor, Airway controls.
Ingersoll-Rand turbo compressor 10500 CFM @ 20 oz. 85 HP G. E. 220V 3500 CFM motor.

CLEANING EQUIPMENT

Sly 8′ dia. Table Shot Blast Unit.
36 x 42 Halloway 7½ HP shot motor elevator and dust collector.

CORE BLOWERS

3—International SB 12.
4—International SB 13.
1—Osborn 93.
12—Osborn 193.
1—Osborn 2035-2.
1—Peterson (Similar to Demmler #50).

CORE OVENS VERTICAL HORIZONTAL

1—Coleman, combination oil or gas fired 43 carriers 24″ x 90″—1 hour 12 min. to 4 hours 48 min. cycle.
1—Coleman, combination oil or gas fired 43—2 shelf carriers 30″ x 144″ long. 2 hour 12 min. to 7 hour 24 min cycle. Present replacement cost over $90,000.

EXHAUSTERS

We have a large stock of exhaust blowers. 5 to 25 HP. Write for list.

GRINDERS, SNAGGING

5—Hammond 10 W R I Double End Snag. Grinders 20″ dia. wheels, 10 HP 220/440 V motors, variable speed drives.
3″ x 24″ U.S. #65, 20 HP 220/440V.

GRINDERS, SWING FRAME

2—3″ x 24″ x 12″ Fox #4, 15 HP.
1—3″ x 24″ x 12″ Marschke, 20 HP.
1—3″ x 24″ x 12″ U.S. 15 HP.

HOT METAL CARRIER SYSTEM

7—1 ton D.C. Cab operated Cleveland, Monotractor Hot Metal Carriers 800′ Arch Beam Rail.

MOLDING MACHINES

Jolt Squeezers:
13—Milwaukee 103-11 Staty. Jolt Squeezers, 13½″ x 20″ table.
7—Champion JS10P Portable Jolt Squeeze molding machine, 18″ x 21″ table.

Jolt Squeeze Pin Lifts BIG ONES:
2—International PK 20's. 20″ squeeze cylinder 8″ draw. Ser. #67237. New 1949.
1—Osborn 712 PJ. Stationary Jolt Squeeze pin lift 18″ x 28″ table, 12″ squeeze cylinder, 6″ draw.
2—Milwaukee Jolt Squeeze Strippers, Model 163-50, 15″ x 24″ table 16″ X open end pattern size.
1—SPO 214 Jolt Squeeze Pin Lift.
1—Milwaukee 126-3 Jolt Squeeze Pin Stripper, 27″ x 21″ table, 8″ draw.

ROLLOVERS—

Jolt Rollover Pattern Draw
1—Herman 4000# Series 30″ x 60″ table, 32″ x 48″ bumper.
1—Herman 3000# Series 40″ x 84″ table, special slotted table.
1—Herman 1500# Series 20″ x 36″ table.
2—Herman 750# Series 20″ x 30″ table.
2—Herman 750# Series 20″ x 24″ table.
All the above have air clamps rollout tables.
2—Champion JM-18-8 Jolt Rollovers, portable 13½″ x 20″ tables.
1—Davenport 24 SA Jolt Rollover Pattern Draw. 26″ x 42″ flask size, 12″ draw.

Jolt Pin Lifts:
Pin Lift Pushoffs:
2—Champion Pin Pushoffs 28″ x 42″ table 10″ draw.

MULLERS AND MIXERS

1—Link Belt Double Screw-Mixer, 50 ton per hour.
1—Link Belt Single Screw Sand Mixer.
Simpson #3 Type H open gear type.
Simpson #3 Muller with bucket loader.
Simpson #3 Open Gear type, $1000.

OVENS, MOLD OR CORE

Porbeck Double Car Single door 16′ long 14′ wide 9′ high gas fired 600° recirculating complete with 7½ HP car puller, in place St. Louis, Mo.
Core Oven Electric 68″ x 42″ high, 65″ deep 100°-650°.

POURING DEVICES

13—Pouring devices, Whiting 750# and 1500#.

PREPARATOR

B&P #70 Preparator. Only used 3 months.

SHAKEOUTS

Link Belt 3 x 5.

SAND SLINGER

B&P Stationary Slinger with bucket elevator to 10′ x 10′ x 6′ sand storage bin, conveyor feeder to double belt head 19″ head single speed.

TUMBLING BARREL

2—Whiting 36″ x 60″ tumbling barrel driven by 15 HP Jones motor reducer. Individual clutch on each barrel. Can be separated.

WIRE STRAIGHTENERS

Climax #3 Wire Straightener ¼″ to ¾″ dia. wire. 2 HP.

ACME

ACME EQUIPMENT CO., INC.

We will buy for cash a single piece of equipment or your entire foundry

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MONA

Castings Conveyor and Cooling Tower for Sale at Scrap Value

HERE'S WHAT WE WILL SELL FOR $15,000

4580′—Jervis B. Webb 678 Chain.
4580′—6″ Rail
1560—Webb or L-B 6″ Trolleys
4—Motor Driven Caterpillar Drives D.C.
1—D.C. Motor Generator Set.

All turns, takeups, work carrying baskets, hooks, etc. All the outdoor steel supporting structure of the cooling tower 45′ high, 125′ long, 20′ wide.

Price $15,000, present location Cleveland, Ohio, buyer to load.

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ELECTRIC melting furnaces

BUY FROM SPECIALISTS...LARGEST, MOST COMPLETE STOCKS

1—1500 KVA G. E. Transformer with taps for 11,000 or 13,800 volts.

Lectromelt 1 ton Side Charge with 800 KVA, 12,000 V transformer. Late type unit. Complete. Now in our Chicago warehouse.

1—Chicago 3000# Electric Furnace, tilt back head. 4″ electrodes, 800 KVA, 12,000 V transformer. Complete. May be seen in place Chicago.

1—Swindell Type 6 ton 9′ diameter Shell Electric Furnace, 2500 KVA transformer, 13,800 or 11,000 V. In our Chicago warehouse.

Lectromelt 500# Side Charge Type T, 300-375 KVA transformer, 2300 V primary, Moore controls, G. E. circuit breaker. Late type. Now in our Chicago warehouse.

Transformers—2—2500 KVA furnace transformers, 11,000 or 13,800 primary voltage.

1—Detroit Electric, 1500# capacity, 13,200 primary voltage. Kuhlman transformers. Complete with controls.

Detroit Electric 350#, Type LFA with Kuhlman transformers and oil circuit breaker, 13,200 primary voltage.

Detroit Electric with 350# and 1000# tapered shells, 2300 V Kuhlman Transformer. Complete with panelboard and bus bars.

Herrault 2000# Side Charge, complete with Pennsylvania 1500 KVA transformer, 12,000 volt primary and 150-90 volt secondary. New control panel; new Field Rheostat, new motor generator set-ball bearing, 25 HP 3/60/440 V/1800 rpm, 250 V compound wound. With 51 nipples and sufficient roof brick for almost six roofs.

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GUARANTEED FOUNDRY EQUIPMENT

CONVEYORS: 24″, 30″ & 36″ flat belt, troughing, bucket, steel apron

CUPOLAS: 2—#11 Whiting, 1—#3½ Modern

CORE OVENS: 2 compartments Coleman, recirculating, all controls overall 14′7″ x 17′4″, 6′ x 7′ doors

LARGE MOLDING MACHINES: Davenport 40A, 40SA, 34SA, 28SA, 40AJS
Johnston & Jennings Model 815
Herman 40″ x 60″ 6000 lbs.
Osborn 405-95—26″ draw
Jolt Squeeze Strip—Nichols 24-54D
Jolt Pin Lift—Davenport, Nichols, Osborn, Spo, Milwaukee, Herman

SAND MULLERS: Simpson #3, B-P #30 & #70, 7 cu ft. Mulbaro

We carry all makes and types of foundry equipment in stock. Send for our complete listing.

• • SPECIAL SALE • •

1 complete gray iron foundry, 18000 sq ft., #7 Whiting cupola
80 miles southwest of Cleveland.

WE BUY AND SELL COMPLETE FOUNDRIES

Miscellaneous Foundry Equipment

Air Hoists
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Furnaces:
- Non ferrous
- Annealing
- Heat treat

Grinders:
- Horizontal disc
- vertical disc
- double end stand
- swing

Ladles:
- Industrial
- Modern
- Timken
- Whiting

Molding Machines:
- Jolt Squeezers
- Jolt Strippers
- Jolt Rollovers
- Jolt Squeeze Strip
- Pushoff

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Sand Conditioners
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- Steel

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RECONDITIONED FROM STOCK

AIR & ELECTRIC HOISTS

22—**INGERSOLL-RAND** Air Hoists, 700 lbs capacity through 10,000 lbs, all sizes.
1—**DETROIT** 5 ton cap. Model LHR.
1—**ELECTRO-LIFT** 3000 lbs cap. 4 HP
1—**SHAW-BOX** Load Lifter Jr. 1000 lbs

CORE BLOWERS

1—#2 **DEMMLER.**
1—#1 **DEMMLER.**
2—#92 **OSBORN.**
2—#193 **OSBORN.**
1—#91 **OSBORN.**
1—#192 **OSBORN.**
2—CB-400 **CHAMPIONS.**
6—**MILWAUKEE**—Taccone Model A-3.
5—**REDFORD** #1 Bench Type w/cartridges.

CUT-OFF SAWS & STRAIGHTENERS

1—**TESSMER** Model H Sprue Cutters.
1—**CLIMAX** #2A Wire Straightener.
1—**DEWALT** Model Me2V Foundry Type Cut-Off Saw with 10 HP motor.

CONVEYORS—ROLLER-BELT

1—**FARQUHAR** 18" x 35' portable Trough.
1—**FARQUHAR** 18" x 19' Car Unloader.
2000'—**MATHEWS** Gravity Roller Conveyor, 10"—16"—18" width rollers, standard & heavy duty, FOUNDRY TYPE.
1—**LINK-BELT** Overhead Conveyor, 100' track, chain, trolleys, curved, motorized.

CUPOLA & FURNACES BLOWERS

1—**INGERSOLL-RAND** Centrifugal Type FS-367 with 100 HP motor.
7—Furnace Blowers 1-3-5-7½ HP, 16 oz.

CORE OVENS

1—**FOUNDRY EQUIPMENT** 4 Compartment 6' x 8' x 10' each, gas fired with controls, recirculating, like NEW.
1—**INDUCTION HEATING** Dialectric Model M-800A, 600 lbs. per hour 300 hrs. use.

DUST COLLECTORS & ROTO-CLONES

1—**AMERICAN AIR FILTER** No. 14 Type W arrangement "C" with sludge ejector.
1—**AMERICAN AIR FILTER** No. 27 Type W arrangement "C," with sludge ejector.
1—**AMERICAN AIR FILTER** Type N, Size 10 with No. 14 Roto-Clone & sludge ejector. Grinding Bench type.

ELECTRIC MELTING FURNACES

5—**DETROIT** Type AA Rocking 750 to 1000 lbs, w/325 KVA Transformers.

GAS & OIL FIRED FURNACES

3—**LINDBERG-FISCHER MNP** Size 2400 lbs gas or oil fired, motorized, complete.
1—**LINDBERG-FISCHER MNP** Size 225 lbs, gas or oil, w/motor-blower etc.
2—**LINDBERG-FISHER** Type BBI, 400 lb crucible type, hand tilt, gas or oil.
1—**STROMAN** Model U, 600 lbs Reverberatory, tilting, gas or oil fired.
2—**STANDARD** #30 & #150 Crucible, Stationary, gas or oil, w/motor-blower.
11—**HAUSFELD** #200 Crucible, stationary, gas fired, NEW 1952.
1—**STROMAN** Model NP, 125-175 Crucible, Mechanical Tilt, gas fired.
2—**CAMPBELL-HAUSFELD** IPNT Iron Pot Type, 2000#'s Cap. gas or oil.

G. E. INDUSTRIAL X-RAY

Model KX 10, Type 1, 115 volts, 50/60 cycles, 13 amps. Serial 425456.

GRINDERS—SWING—SNAGGING—STAND

2—**FOX** #5 High Speed Stand, wheel 24" x 3"—10 HP motor.
1—**FOX** #7 High Speed Stand, wheel 30" x 3"—15 HP motor.
1—**HAMMOND WR-1** Double End Snag, wheel 24" x 3"—10 HP motor.
1—**U. S.** Electric Swing Frame, 15 HP, 2 speed, wheel 24" x 3" x 12".
6—**U. S. ELECTRIC** #65 Snag Grinder, 15 & 20 HP—4 speeds, wheel 30" x 4".
2—**U. S. ELECTRIC** #64 Snag Grinders, 7½ hp, adjustable speed, wheel 14" x 3".

LADLES & POURING DEVICES

6—**INDUSTRIAL** Lip Pour 24" x 24" rated 1600 lbs. enclosed Timken Gearing.
4—**MODERN** 1500 lb. Cylindrical Type, 29" x 30", w/bails, covers & stands.
10—**WHITING** Models 1000 & 2000 Pouring Devices w/400 lb ladle, hand tilt.
3—**WHITING** 275# Cylindrical Type V-bail, 19" diam x 16" length, covered.

INDUCTION MELTING—HEAT TREATING

1—**LEPEL** 30 KW Spark Gap Converter w/controls & 20 lb furnace & stand.
1—300 KW **G.E.** alternating current generator, 800 volt, 3600 RPM, 1 phase with 450 HP G.E. motor & controls.
1—Lindberg Model 4860 GH, Cyclone Type gas fired, with all controls.

MOLDING MACHINES

1—**INTERNATIONAL** PKL Jolt Squeeze Strip, 18" x 24" table, 6" draw.
1—**INTERNATIONAL** LP-10 Jolt Pin Lift.
5—**OSBORN** #275J Jolt Squeezers, 10" cyl.
1—**MILWAUKEE** No. 125-3 Jolt Squeeze Pin Lift, table 21" x 27", 1200# jolt
1—**DAVENPORT** #24SA Jolt Rollover, 24" x 38" Table, 12" Draw, 1000#.
2—**OSBORN** #710J Jolt Squeeze Pin Lift, 16" x 25" table, 6" draw, 10" squeeze.
1—**OSBORN** No. 563-9 Jolt Pin Lift 55" x 63" table, 12" draw, 7000 lbs. Jolt.
1—**OSBORN** #342-1 Jolt Rock-Over Pattern Draw, 23" x 38" table, 10" draw, 1000#.
2—**OSBORN** #405 Jolt Rollover, table 57" x 64", 26" draw, 3000 lbs jolt w/rollout.
4—**OSBORN** #210 PJ Jolt Squeezers.
4—**OSBORN** #40 & #42 Core Rollovers.
2—**HERMAN** Jolt Rollover Pattern Draw, 6000 series, 42" x 78" table, 6000 lbs.
2—**HERMAN** 40" x 60" Plain Jolt.
1—**JOHNSON & JENNINGS** #815 Jolt Rollover Pattern Draw, 30" x 40" table.
2—**TABOR** 22" x 42" Jar Rollovers.
2—**TABOR** 30" x 40" Jar Rollovers.
2—**SPO** #507 Jolt Rock-Over Pattern Draw, 32" x 40" table, draw 10 to 20".
1—**SPO** #508 Jolt Rock-Over Pattern Draw, 28" x 30" table, 9" draw, 1200# jolt.

SAND MULLERS

1—**BEARDSLEY & PIPER** #60.
1—**BEARDSLEY & PIPER** #50, Speed Muller w/skip hoist, dust hood, 50 HP.
1—**BEARDSLEY & PIPER** #30.
1—**BEARDSLEY & PIPER** #70
3—**SIMPSON** #2 style UD—skip loader.
1—**SIMPSON** #3 style C, separate drive enclosed gearing 8' pan, 3000# batch.
1—**SIMPSON** #1½, style UD, 4'6" pan 700# batch, w/skip hoist, water meter.

SAND PREPARATORS

1—**B & P** #70 Portable Preparator w/gyrating screen, aerator, magnetic separator, 90 cu. ft. hopper.
1—**AMERICAN** Model AM Sand Cutter, size 69/45.
1—**AMERICAN** Model BD Sand Cutter, size 75/60.

SAND SLINGERS

1—**B & P** 19" Tractor Type, 13' arm.
1—**B & P** 16" Tractor Type, 13' arm, magnetic tower, 4' ramming 4" tip.

SHAKEOUTS & SCREENS

1—**ROYER** Combination Shakeout & Sand Conditioning unit, serial #ST-47.
4—**SIMPLICITY** 4' x 6' Model B, 5000#.
1—**SIMPLICITY** 4' x 10' Model D with Automatic Crusher, 15,000# load.
3—**SIMPLICITY** 3' x 6'—Model BG, 5000#.
1—**SIMPLICITY** 6' x 8' Model DE.

TUMBLING BARRELS

2—**SLY** 42" x 72" Square, with 10 HP Gearhead motor—magnetic brake.
1—**SLY** 42" x 66" Type C—10 HP motor.

FOUNDRY LIQUIDATION EQUIPMENT
New 1949-1953
Modernize & Save!

AIR COMPRESSORS

1—**INGERSOLL-RAND** Type ES1, 300 CFM, size 11" x 12".

CORE OVENS

1—**INDUSTRIAL** Continuous Type, trays 18" x 80" long, overall 83" high, gas fired recirculating.
1—**PORBECK** Batch Type, gas fired, recirculating; 10' wide, 7' high, 11' deep.

CUPOLA & ACCESSORIES

1—**BASIC REFRACTORIES BRI** Gun, Model A10 (similar to Bondactor).
1—**FOXBORO** Air Weight Controller.
1—**HAUCK** Lighter Tank & Torch.
1—**WHITING** No. 6 Cupola.
1—**ROOTS CONNERSVILLE** Rotary Positive Blower, size 5½, with 40 HP.

MOLDING MACHINES

1—**JOHNSON & JENNINGS** 612RBP Jolt Rollover Pattern Draw, table size 24" x 30", 12" draw, 600# capacity.
1—**MILWAUKEE** No. 1536 Jolt Pin Lift table 32" x 38", 1500 lb. jolt, 12" draw.
1—**OSBORN** 710PV Vibrating Jolt Squeeze Pin Lift, table 16" x 25", 6" draw.
2—**SPO** No. 2136 Jolt Squeeze Strip, table 21" x 30", 800 lb. jolt, 6" draw.
1—**SPO** No. 2160-1 Jolt Squeeze Strip, table 21" x 30", 800 lb. jolt, 6" draw.
1—**SPO** No. 2168 Jolt Squeeze Strip, table 25" x 34", 1500 lb. jolt, 8" draw.
1—**SPO** No. 214 Jolt Squeeze Strip, table 23" x 31", 1000 lb. jolt, 6" draw.

MATERIAL HANDLING EQUIPMENT

194 **INGERSOLL-RAND** RC-5 Air Bloc Type Air Hoists, 500 lb. cap., with roller chain, chain buckets pendant throttle controlled.
25—**INGERSOLL-RAND** Air Hoists, Sizes A, B, D, D-6 and E, 500 to 10,000 lb.
1—**ELECTRIC BRIDGE** Crane, 25' span, with 2 ton R & M Hoist, 150' track.
1—**JEFFREY** Trough Belt Conveyor, 75' centers, belt 24", with motor drive.
1—**JEFFREY** Trough Belt Conveyor, 103' centers, 24" wide, with 18" x 24" magnetic pulley motor & drive.
3—**LOUDEN MONORAIL SYSTEMS,** "Super Track" (1) 110' of 6" I-beam & two 20' bridges (2) 140' of 6" I-beam & two 12' bridges (3) 130' of 11" I-beam & two 30' bridges; all complete.
1—Power Crane, 25' span, 120' runways 12" beam, Tramrail Hoist.

PAYLOADER

1—**HOUGH** Model HA, complete with 48", 12 cu. ft. bucket Serial No. 25081.

ROTO-CLONE DUST COLLECTORS

1—**AMERICAN AIR FILTER** Type N Size 20, 20,000 CFM, with 75 HP motor.
1—**AMERICAN AIR FILTER** Type N, Size 24, 24,000 CFM, 75 HP motor.

SAND MULLERS

1—**SIMPSON** #1-H, Style K, unit drive type, 4' pan dia. 500 lb. batch size.
1—**SIMPSON** #2F, Style UD, 80" pan dia., 2000 lb. batch size, 30 HP motor, with skip hoist, aerator, water meter.

SAND PREPARATORS

1—**AMERICAN** Sand Cutter, Model AA, 6'0", Serial No. 643, power all around.
6—**BEARDSLEY & PIPER** Models S, M and L Screenerators.
8—**ROYER** Sand Conditioners, all models, Jr., NC-2, NDP C-2, etc., portable.
1—**SIMPLICITY** Model LP 2' x 3' Screen.

SCALES

1—**FAIRBANKS MORSE** Open Dial, 4' x 5' platform, 6000 lb. capacity.

WHEELABRATORS

1—**AMERICAN** 36" x 42" Tumblast, skip hoist dust collector. NEW 1951.
1—**AMERICAN** 42" x 48" Tumblast, with skip hoist.
1—**AMERICAN** 27" x 36" Tumblast with skip hoist loader.

Write for Completely New Illustrated Catalog of Used Foundry Equipment

AAA MACHINERY & EQUIPMENT CO.

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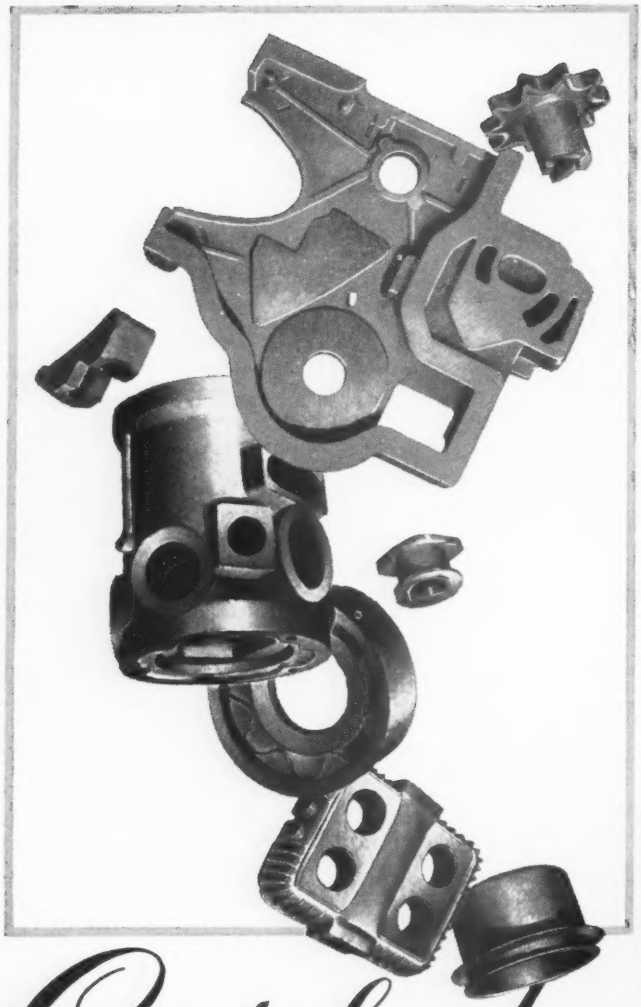


Certified ABRASIVES

CLEANED THESE CASTINGS CHEAPER!

When you are looking for lower costs, clean your castings cheaper, better with "Certified" Samson Shot and Angular Grit. They're *extra-tough*—really do a thorough cleaning job! The certificate with every shipment is your assurance of uniformity, controlled analysis, and quality unequalled in the production of chilled iron abrasives. Cut *your* cleaning costs! Switch to "Certified" Abrasives.

ACCEPTED AND USED FOR OVER 60 YEARS

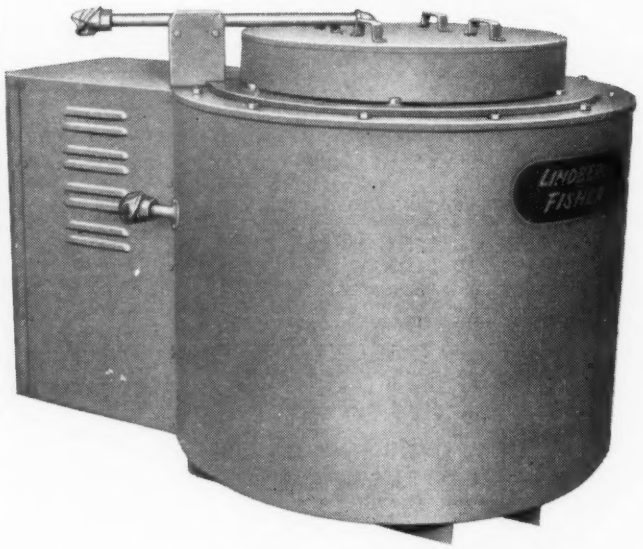
PITTSBURGH CRUSHED STEEL CO.
Pittsburgh, Pa.
STEEL SHOT & GRIT CO.
Boston, Mass.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

New From Lindberg-Fisher

For Permanent Mold and Sand Casting of Aluminum, Magnesium, Zinc and Lead.

A Lindberg-Fisher Electric Resistance Melting Furnace can mean lower cost per lb. of finished casting.



These furnaces eliminate localized heating of metal, eliminate gas absorption, because there are no products of combustion present. Higher production results, due to less operator fatigue. Exhaust fumes and smoke are nonexistent and radiation loss is held to an absolute minimum by use of high quality insulation.

Longer crucible or pot service and low furnace maintenance are obtained with the patented long life, low voltage elements.

Can also be used as a holding furnace on die casting applications.

Write for Bulletin No. 320

LINDBERG FISHER MELTING FURNACES
A Division of Lindberg Engineering Company
2453 WEST HUBBARD STREET, CHICAGO 12, ILLINOIS

ADVERTISING INDEX

A

Abrasive Shot & Grit Co., Inc. 217
Acheson Colloids Co. 25
Acme Aluminum Alloys, Inc. 244
Acme Foundry Co. 241
Ajax Electric Co. 70
Ajax Electric Furnace Co. 70
Ajax Electrothermic Corp. 70
Ajax Engineering Corp. 70
Allied Chemical & Dye Corp., Solvay Process Div. 43
Allis-Chalmers 47
American Air Filter Co., Inc. 17
American Brake Shoe Co., Electro-Alloys Div. 66
American Bridge Div., United States Steel Corp. 215
American Chain & Cable, American Chain Div. 146
American MonoRail Co. 230
American Optical Co., Safety Products Div. 56
American Saw & Mfg. Co. 245
American Smelting & Refining Co., Federated Metals Div. 209
American Steel Abrasive Co., The 245
American Wheelabrator & Equipment Corp. 20, 73
Archer-Daniels-Midland Co., Foundry Products Div. 4, 5
Aro Equipment Corp., The 79
Automotive Pattern Co. 234

B

Babcock & Wilcox Co., The, Refractories Div. 153
Baker Perkins, Inc. 127
Baker-Raulang Co., The 222
Baldwin-Hill Co. 141
Barium & Chemicals, Inc. 207
Baroid Div., National Lead Co. 62
Bartlett, C. O., & Snow Co., The Back Cover
Basic Refractories, Inc. 191
Beardsley & Piper Div., Pettibone Mulliken Corp. 58, 59, 149, 150
Bell, M. A., Co. 182
Beryllium Corp., The 198

C

Carborundum Co., The 64, 65, 236
Carl Mayer Corp., The 159
Carman, Edwin S., Inc. 242
Centrifugal Casting Machine Co. 123, 242
Chicago Eye Shield Co. 142
Christiansen Corp. 125
Cincinnati Milling Machine Co., The, Cincinnati Milling Products Div. 184, 185
Cities Service Oil Co. 139
Clark Equipment Co., Construction Machinery Div. 177
Clark Equipment Co., Industrial Truck Div. 76
Clearfield Machine Co. 19
Cleveland Chaplet & Mfg. Co. 147
Cleveland Crane & Engineering Co., The, Cleveland Tramrail Div. 74
Cleveland Flux Co., The 169
Cleveland Metal Abrasive Co., The 204
Cleveland Tramrail Div., The Cleveland Crane & Engineering Co. 74
Cleveland Vibrator Co., The 235
Climax Molybdenum Corp., The 15
Columbia-Southern Chemical Corp. 246
Corn Products Refining Co. 50
Crucible Manufacturers' Association 172

D

Dayton Pneumatic Tool Co. 240
DeBardeleben Coal Corp. 245
Delta Oil Products Co. 36
Demmler, Wm., & Bros. 37
Desmond-Stephan Mfg. Co., The 225
Detroit Electric Furnace Div., Kuhlman Electric Co. 80
Detroit Testing Machine Co. 237
Dietert, Harry W., Co. 202
Durez Plastics Div., Hooker Electrochemical Co. 227

E

Eastern Clay Products Dept., International Minerals & Chemical Corp. 13
Eastman Kodak Co., X-Ray Div. 145
Electric Furnace Co., The 246
Electro-Alloys Div., American Brake Shoe Co. 66
Electro Metallurgical Co., A Div. of Union Carbide & Carbon Corp. 18, 238
Erie Strayer Co. 226

F

Fanner Mfg. Co., The 164
Federal Foundry Supply Co., The 2, 30, 31
Federated Metals Div., American Smelting & Refining Co. 209
Foundry Equipment Co., The 9
Foxboro Co., The 39
Fremont Flask Co., The 46
Frontier Bronze Corp. 27
Fuller Co. 60

G

Gardner-Denver Co. 156
Gerotor May Corp. 208
Girdler Co., The, A Div. of National Cylinder Gas Co. 174
Gray Iron Founders' Society 53
Great Lakes Carbon Corp., Electrode Div. 155
Great Western Mfg. Co. 239

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ADVERTISING INDEX

H

Hanna Furnace Corp., The 44
Harbison-Walker Refractories Co. 11
Harrisburg Steel Corp., Taylor-Wharton Iron & Steel Co. Div. 242
Haylco Controls Corp. 229
Herman Pneumatic Machine Co. 40, 41
Hewitt-Robins, Inc. 45
Hickman, Williams & Co. 136
Hines Flask Co., The 48,49
Hooker Electrochemical Co., Durez Plastics Div. 227
Hough, Frank G., Co., The 212, 213
Hunt, C. B., & Son, Inc. 189

I

Imperial Belting Co. 10
International Minerals & Chemical Corp., Eastern Clay Products Dept. 13
International Molding Machine Co. 163
International Nickel Co., Inc., The 1
Ironton Fire Brick Co., The 179

J

Jaeger Machine Co., The 42
Jeffrey Mfg. Co., The 167
Johns-Manville 194, 223
Johnston Mfg. Co. 228
Joy Mfg. Co. 22

K

Keokuk Electro-Metals Co. 24
King, Andrew 246
Kuhlman Electric Co., Detroit Electric Furnace Div. 80

L

Laclede-Christy Co. Div. of H. K. Porter Company, Inc. 197
Lanly Co., The 233
LeRoi Div. of Westinghouse Air Brake Co. 8
Lindberg Engineering Co., Lindberg Fisher Div. 256
Lindberg Fisher, A Div. of Lindberg Engineering Co. 256
Link-Belt Co. 61
Louthan Mfg. Co. 57

M

Manley Brothers, Inc. 14
Manley, Lyle T., Co. 14
Master Pneumatic Tool Co., Inc., The 244
Mathews Conveyer Co. 188
Metal Blast, Inc. 78
Michigan Oven Co. 244
Milwaukee Chaplet & Mfg. Co. 137
Modern Equipment Co. 260
Molybdenum Corp. of America 26
Monsanto Chemical Co., Plastics Div. 21
Morse Boulger Destructor Co., Robinson Air-Activated Conveyor Systems Div. 6, 7
Mullite Refractories Co., The 224

N

National Cylinder Gas Co., The Girdler Co. Div. 174
National Dust Collector Corp. 143
National Engineering Co. 132, 133, 134, 135
National Lead Co., Baroid Div. 62
National Steel Corp. 44
Neff & Fry Co., The 228
Newaygo Engineering Co. 16
Newcomb-Detroit 241
Nicholls, Wm. H., Co., Inc. 77
Nomad Foundry Equipment Div. of Westover Engineers 235
Norton Co. 23, 28, 29, 67

O

Ohio Electric Mfg. Co., The 245
Olin Mathieson Chemical Corp., Industrial Chemicals Div. Inside Front Cover
Oliver Machinery Co. 246
Osborn Mfg. Co., The 218, 219

P

Pangborn Corp. 83
Penn Iron Works, Inc. 243
Pettibone Mulliken Corp., Beardsley & Piper Div. 58, 59, 149, 150
Pickands Mather & Co. 201
Pittsburgh Coke & Chemical Co. 120
Pittsburgh Crushed Steel Co. 256
Pittsburgh Lectromelt Furnace Corp. 187
Pittsburgh Metals Purifying Co. 82
Porcelain Products, Inc. 220
Porter, H. K. Company, Inc., Laclede-Christy Co. Div. 197

R

Reda Pump Co. 237
Redford Iron & Equipment Co. 63
Reichhold Chemicals, Inc. 72
Republic Coal & Coke Co. 243
Rice Pump & Machine Co. 242
Richardson Scale Co. 243
Robinson Air-Activated Conveyor Systems, A Div. of Morse Boulger Destructor Co. 6, 7
Ross Operating Valve Co. 51
Roura Iron Works, Inc. 224
Royer Foundry & Machine Co. 119

S

Schenectady Resins Div. of Schenectady Varnish Co., Inc. 211
Schneible, Claude B., Co. 32
Schramm, Inc. 52
Shanafelt Mfg. Co., The 171
Shepard Niles Crane & Hoist Corp. 200
Sidley, R. W., Inc. 246
Sly, W. W., Mfg. Co., The 183
Smillie, C. M., & Co. 147
Smooth-On Mfg. Co. 240
Solvay Process Div., Allied Chemical & Dye Corp. 43
Spincraft, Inc. 217
SPO, Inc. 68, 69
Standard Conveyor Co. 203
Standard Electrical Tool Co., The 199
Standard Horse Nail Corp. 236
Stearns Magnetic, Inc. 210
Steel Shot & Grit Co. 256
Steel Shot Producers, Inc. 229
Sterling Wheelbarrow Co. 84, 234
Stevens, Frederic B., Inc. Inside Back Cover

T

Tabor Mfg. Co., The, Div. of Turbo Machine Co. 38
Taylor-Wharton Iron & Steel Co., Div. of Harrisburg Steel Corp. 242
Thermal Research & Engineering Corp. 221
Thiem Products, Inc. 161
Timken Roller Bearing Co., The 71
Toledo Scale Co. 216
Turbo Machine Co., The Tabor Mfg. Co. Div. 38

U

Union Carbide & Carbon Corp., Electro Metallurgical Co. 18, 238
United Oil Mfg. Co. 129
United States Graphite Co., The, Div. of The Wickes Corp. 130
United States Rubber Co. 81
United States Steel Corp., American Bridge Div. 215
United States Steel Corp., Subsidiaries 215
Universal Clay Products Co., The 240
Universal Engineering Co. 75

W

Wellman Bronze & Aluminum Co., The 12
Westinghouse Air Brake Co., LeRoi Div. 8
Westover Engineers, Nomad Foundry Equipment Div. 235
Whitehead Brothers Co. 35
Whiting Corp. 54, 55
Wickes Corp., The, The United States Graphite Co. Div. 130

Table of Contents, Page 3

Classified Advertisers, 247, 248, 249, 250, 251, 252, 253, 254, 255

Continued on Page 258

COMING—in the SEPTEMBER ISSUE!

A SPECIAL EDITORIAL REPORT ON THE NEW

Chevrolet Tonawanda Foundry

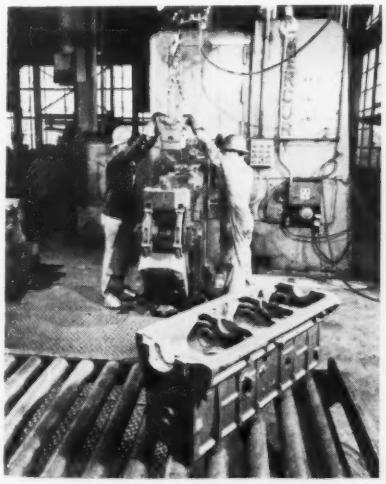
THE EDITORS OF FOUNDRY secured the cooperation of General Motors Corp. several months ago and will present a detailed word-and-picture story of the new Chevrolet gray iron foundry in Tonawanda, N. Y. in the forthcoming September issue.

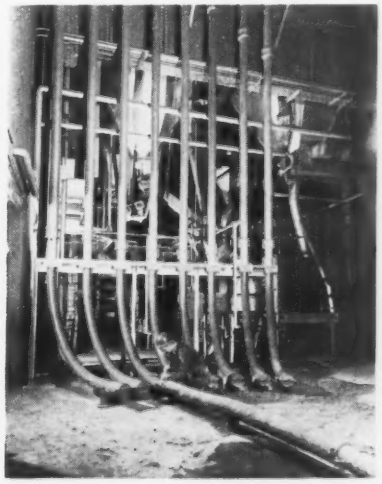
THE CHEVROLET STORY will be told and will appear in addition to regularly scheduled editorial features.

TAKING ITS PLACE with the Studebaker story (August 1951) and the Ford story (March 1953), the Chevrolet report will be another new chapter on foundry progress. It will appear complete in this issue.

SOME INTERESTING FACTS on the new Chevrolet foundry: Now in operation, this new production foundry is operating continuously over two 8-hour shifts, employs 2,000 workers and is pouring 1,000 tons of gray iron every 16 hours. Daily production consists of 3,520 V-8 and 6 cylinder engines. The foundry is located on a 155-acre site which includes an engine plant where castings are machined and engines finished.

SAND STORAGE for 25,000 tons of sand, 6 cupolas of 30 tons per hour melting capacity suggest the scope of the operation in the new Tonawanda plant.





STARTING—*in this issue!*

MEN, MACHINES, METAL & SAND by Harry M. St. John, Foundry Consultant. The first of several great articles for brass founders.

COMING IN OCTOBER:

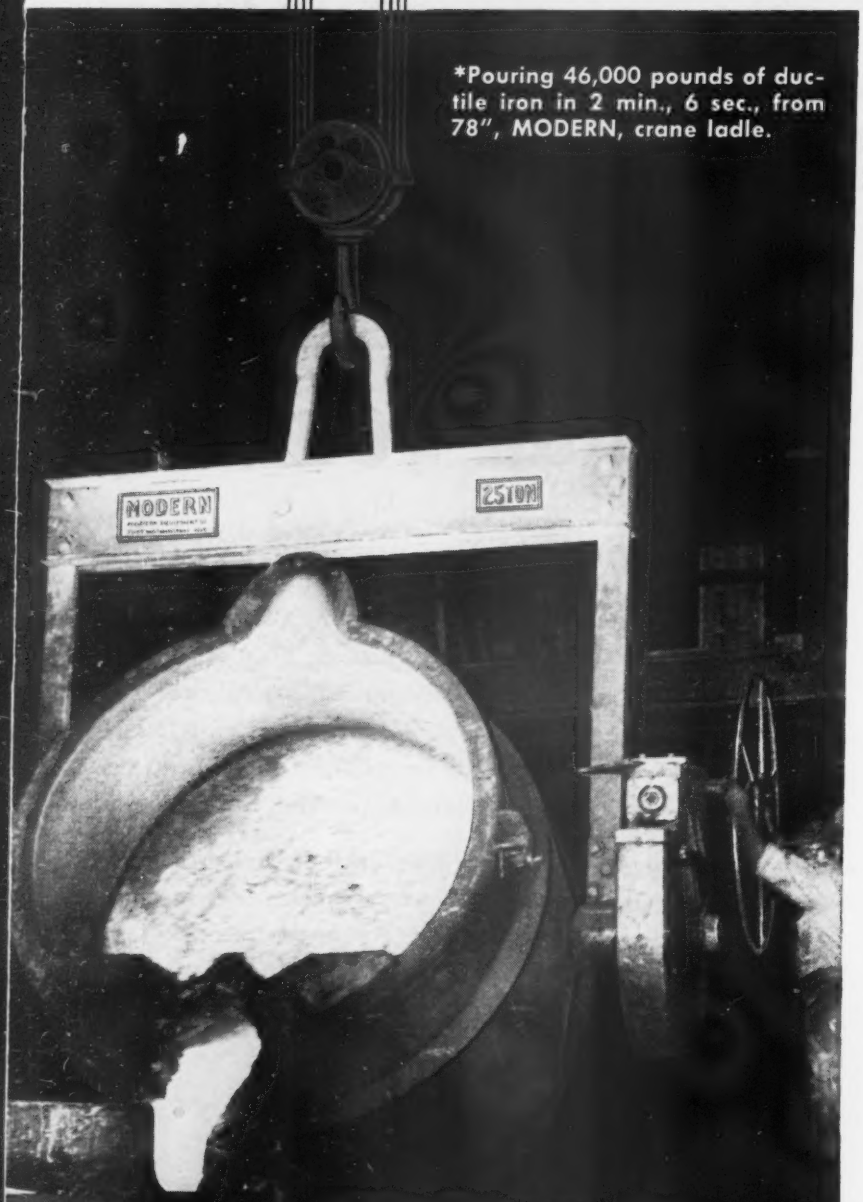
SHELL MOLDING AT LYNCHBURG FOUNDRY. The complete story of Lynchburg's important new shell mold production foundry.

COMING IN NOVEMBER:

INVENTORY OF MATERIALS HANDLING EQUIPMENT. This will be another FOUNDRY Editorial-Market Research Staff special Report.

LADLES ENGINEERED TO THE JOB

Pay off in three Big ways...



*Pouring 46,000 pounds of ductile iron in 2 min., 6 sec., from 78", MODERN, crane ladle.

1 *UNIFORMITY OF METAL CAST . . .
2 MORE PAY-TIME OVER THE MOLD . . .
3 REDUCED WASTE, LESS PIGGING . . .

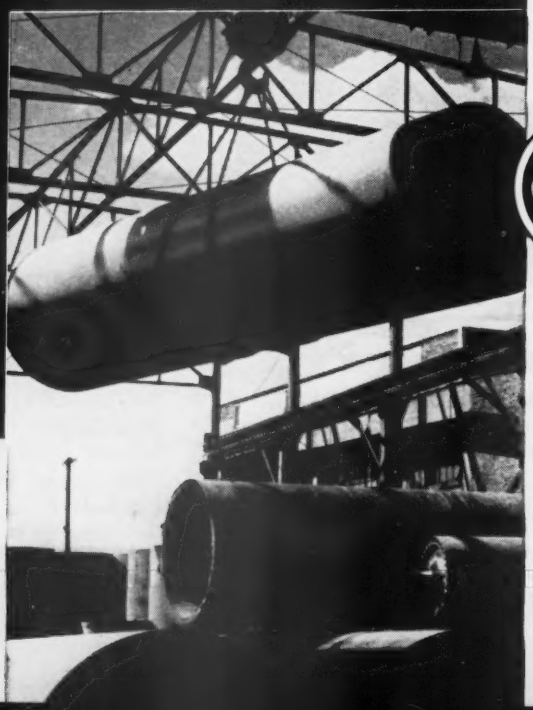
Working closely with practical foundrymen, right out on the job for more than thirty years, has qualified MODERN engineers for designing the difficult, made-to-measure jobs.

*Today it may be receiving the iron direct from cupola at a spout height of 66" and pouring the 46,000 pounds into one mold from one ladle load as shown here. This huge casting was poured in 2 min., 6 seconds. The ladle of 78" top diameter and 65" deep is balanced for use with lining of 3½".

Tomorrow the requirement may be thin-wall brass and the necessary, split-second timing as required for a one-man, non-ferrous, pouring operation from a crucible.

Always regardless of the complexities MODERN ladles are designed to serve in their one-best-way. We'd like to plan with you, too. The savings you make on your engineered-to-the job ladles can be applied to your purchases of POURING DEVICES . . . MONORAIL SYSTEMS and FOUNDRY CRANES!

If your entire problem cannot be stated on the coupon put it on your letterhead, addressed to —



The cast dryer rolls for high production paper making machines are ready for machining after casting at the Beloit Iron Works foundry.

MODERN

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THIS IS THE FORTIETH MOLD . . .

from one application of STEVENS LIQUID PARTING

That's normal experience in a large Midwest foundry that averages 1200 tons of castings per month. They use Stevens Liquid Parting for all of their molding operations. Here's why:

- Stevens Liquid Parting gives up to 60 molds from one application.
- Patterns are left clean, with no adhering sand.
- Molders save time . . . increase production with each mold because they do not have to shake parting on the patterns each time.
- Molds always give smooth castings since sand separates cleanly.

Stevens Liquid Parting can be the answer to your molding problems. Why don't you try Stevens Liquid Parting?

Write for a sample – or call your Stevens representative today.

Exclusive sales agents for Sutter foundry equipment in the United States.

See the Sutter Products advertisement elsewhere in this issue.

FREDERIC B.

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EVERYTHING FOR A FOUNDRY

DETROIT 16, MICHIGAN

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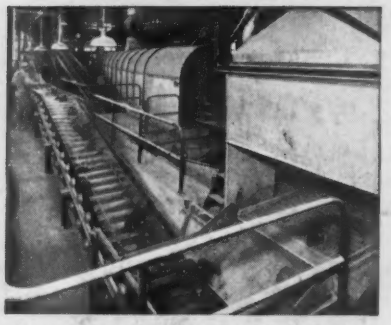
Above; Unloading Zone of 315' Long Sorting Belt Handling Miscellaneous Castings After Grinding.

Above; 370' Long—24" Wide Flat Top Chipping Conveyor Handling Automotive Castings Through Various Cleaning Room Operations. *At the Right;* 130' Long Chipping Conveyor for Finishing Head Castings.

Engineered Castings Handling Systems

. . . assure the continuous, uninterrupted flow of castings through chipping, grinding, sorting and inspection departments; — eliminate repeated handling and rehandling of work in process; — avoid stock piling between operations; — increase tons per hour production per man; — and reduce costs.



Apron Conveyor Handling Hot Castings from Vibrating Shakeout.

Castings Cooling and Sorting Conveyor in Cleaning Room of High Production Gray Iron Foundry.

● Bartlett-Snow castings handling and cleaning room installations reduce the time and cost of handling castings from the shakeout to the shipping room. They synchronize and coordinate all cleaning room operations to the tonnage passing over the foundry shakeout. Belt, apron, oscillating, roller, car type and slat conveyors, engineered to meet your individual requirements!

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